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THE

LONDON JOURNAL

OF

Arts and Sciences;

AND

REPERTORY

OF

PATENT INVENTIONS.

CONDUCTED BY

BY W. NEWTON,

CIVIL ENGINEER AND MECHANICAL DRAFTSMAN.

(Assisted by several Scientific Gentlemen.)

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PREFACE.

IN closing the first volume of a *Conjoined Series* of the **LONDON JOURNAL OF ARTS**, and **REPERTORY OF PATENT INVENTIONS**, the Editor feels much pleasure in renewing his acknowledgements for that extensive and increasing support which his exertions continue to receive both from private sources, and from the numerous subscribers to this work.

If in the execution of twenty-three volumes, which comprehend the First and Second Series of the *London Journal of Arts*, any literary talent may have been displayed, that must be considered as a very subordinate feature in a work exclusively devoted to practical science and improvements in mechanical arts.

There is, however, one peculiar characteristic in this Journal which it has been the unremitted endeavour of the Editor to preserve, viz. to record in its pages a copious and faithful description of EVERY INVENTION that has been made the subject of PATENT RIGHT in ENGLAND—an attempt never before realized in any other publication, and which unique feature alone renders the work an invaluable magazine of information, both to the theoretic and practical mechanic, applying to every branch of the arts, manufactures, and agriculture, and pointing to the various gradations by which improvements have been introduced, and are still making progress in the several departments of operative science, from which we draw our national wealth.

The association of the *London Journal of Arts* with that old and valuable work the *Repertory of Patent Inventions*, affords us the means of rendering our plan still more extensively useful by carrying it back into a retrospective examination of those subjects connected with mechanical improvements, which have been introduced in times past, and are now nearly lost or forgotten.

A revision of all the specifications contained in the early volumes of the REPERTORY, (of which we now possess the original copper-plates, and the entire copyright) with accounts of such other patent inventions as are not there noticed, and may be necessary to render the register complete, is in progress of preparation for the press; and it is intended to publish these reports in parts, by attaching to the current numbers of our present work an occasional appendix sheet, until the whole Series of a RETROSPECTIVE JOURNAL OF ARTS shall be complete up to the end of the year 1819, at which time the first series of the LONDON JOURNAL OF ARTS commenced. From that period all the Specifications of Inventions that have been inrolled in Chancery are in course duly reported in our pages, except some few of the year 1829, which will speedily appear to complete the Ninth Volume of the second series of the *London Journal of Arts*, at present unfinished, owing to the unexpected incorporation of the two works in one, which induced a new arrangement under the title of the "*London Journal of Arts, and Repertory of Patent Inventions, (Conjoined Series,)*" commencing its reports with the beginning of the year 1830.

It may be necessary to observe, that a periodical, under the title of *Repertory of Patent Inventions*, appears to be still publishing, which is got up by some anonymous parties, who have no interest or connexion whatever with the original work, and of whom we have not the slightest knowledge. How this has arisen we are at present unable to ascertain, Mr. W. H. Wyatt, formerly the sole proprietor, having conveyed to us for a valuable consideration, *his entire property and interest in, and copyright of the Repertory of Arts and Patent Inventions, First, Second, and Third Series.* Whether we shall ultimately be compelled to seek redress by legal process, or take the less expensive course of allowing our opponent to die a natural death, is not yet determined; but we consider it a duty due both to our interest and reputation to caution the public against being imposed upon by a production which purports to be a continuation of the original *Repertory of Arts and Patent Inventions*, but with which it has no connexion, and but little resemblance, beyond the cover that envelopes it.

Our subscribers, however, may depend upon our steadily pursuing the course we have proposed, and of rendering the Conjoined Series of the LONDON JOURNAL OF ARTS, AND REPERTORY OF PATENT INVENTIONS, a complete register of the principle and details of every new invention that shall become the subject of patent right in this country, and an extensive miscellany of mechanical information derived from other sources.

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CONJOINED SERIES.

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IV. Selden's Improved Mills; Forrester's Improved Wheels; Barnard's Improved Locks; Mordan and Brockedon's Improved Pens; and Stephenson's Improved Wheels.
V. Knowles's Self-spinning Mule.
VI. Knowles's Self-spinning Mule.
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XX. Lowe's Improved Gas Apparatus; Dickenson's Paper Making, Machinery; Dickenson's Paper Staining Machinery; Ure's Improved Air Stove; and Perry's Improved Pens.

THE

London

JOURNAL OF ARTS AND SCIENCES,

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REPERTORY

OF

PATENT INVENTIONS.

No. I.

(CONJOINED SERIES.)

Recent Patents.

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To Andrew Ure, *of Finsbury-square, in the parish of St. Luke's, in the county of Middlesex, doctor in medicine, for his invention of an improved apparatus, for evaporating syrups and saccharine juices.*— [Sealed 22nd September, 1831.]

In the specification this invention is set forth as follows:— I, the said Andrew Ure, do hereby declare the nature of my said invention for evaporating syrups and saccharine juices to be, an apparatus consisting of a double pan, with an intermediate space, for containing a solution of chloride of calcium, or acetate of soda, the fire being applied to the bottom, or other exterior surface of the outer pan, while the syrup is contained in the interior pan. The saline solution between the two pans, is maintained steadily at a proper degree of dilution or liquidity, and consequently of boiling temperature, by means of certain subsidiary contrivances.

Plate I, fig. 1, represents a vertical section of the apparatus; fig. 2, a plan of the same; fig. 3, an elevation of the thermostatic mechanism; fig. 4, the rake for clearing out the viscid syrup. The same letters of reference indicate corresponding parts of the apparatus in the several figures where they occur; A, A, A, indicate the exterior vessel or bath pan, made of iron, or other suitable metal, for containing the saline solution. This pan may be round, oval, rectangular, or of any other shape, at the pleasure of the operator, and its bottom may be somewhat arched, as a plane surface is apt to warp by alternations of temperature; B, B, B, represent a pipe, terminated at top with a light safety valve, to give vent to the steam thrown off by the saline solution during ebullition. This pipe is bent into a zig-zag or serpentine form, where it passes through the water, in the cistern C, C, to favour the condensation of that steam, and the heating of that water. The water resulting from the condensed steam, flows back into the pan through the small tube D, and is distributed through apertures in its extremity E, along the under surface of the saline solution. The cistern C, is furnished at top with a float and rod, to indicate the depth of water in it; F represents another tube, which issues immediately from the bottom of the cistern at G, and which is intended to supply water to the saline bath, through the stop-cock or valve H, and thence through the perforated tube of distribution E, near the bottom of the pan, whereby the water dissipated by evaporation, is restored, and the equilibrium of dilution is maintained.

The action of that stop-cock or valve of supply H, is regulated by my patent invention, called a "Thermostat," which was inrolled on the twentieth of April, one thousand eight hundred and thirty one (last past). *

The manner in which that invention may be conveniently applied in the present case, is particularly shewn in fig. 3, where *a, a,* are two pairs of compound thermostatic bars acting in concert, the undermost bar of which is fastened firmly by the middle at *b,* to a bracket, bolted to the side of the iron pan, and the uppermost bar is connected at *c,* to an upright rod *d,* which, passing through the stuffing box *e,* moves up and down by the motion in flexure of the said thermostatic bars, correspondent with the increase and diminution of the temperature of the bath. By the operation of this mechanism, aided by the adjustment of the screw nut *f,* which modifies the length of the rising rod *d,* the lever or rack of the stop-cock or valve H, is moved, so as to admit water whenever the saline bath by concentration exceeds in its boiling temperature the desired degree of heat; I, indicates the place of a mercurial thermometer, the bulb of which descends into the saline bath. It serves as a check on the thermostat, and a guide towards its accurate adjustment. The mechanism at K, consists of a stone or other block L, attached by the rod M, to the one end of the balance lever N, to serve as a counterpoise to the damper plate O, which is suspended to the other end of the lever. Should the liquid of the bath be thrown into too furious an ebullition by undue violence of fire, the said block will be raised, and depress the damper plate into the passage of the chimney.

The index P, is calculated to shew the depth of liquid in the bath, and thus affords evidence of its keeping the proper level. At Q, is seen a stop-cock, through which the saline solution may occasionally be run off into the cistern R, and whereby the bath liquid may be reduced to any desired level within the pan. In this way also, the heating medium may be readily withdrawn from contact with the sugar pan S, without extinguishing the fire. The pump T, serves for returning the saline solution into the bath pan through the pipe U. The sugar pan S, may have any desired shape, and its bottom may be either curvilinear or plane, with the requisite declivity towards the pipe of discharge for the syrup, shewn here at V.

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* See London Journal of Arts, vol. viii. p. 307.

The valve or plug is fitted into the inner end of the discharge pipe, so that no syrup is allowed to lodge in the pipe during the operation of boiling. The plug or valve is opened and shut by a screw (as shewn in the plan) or other convenient mechanism. The bottom surface of the sugar pan may be smooth or plane, but the form that I prefer is represented in section at W, fig. 1, where the metallic lamina (sheet copper for example) is corrugated, so as to bring nearly a double surface of metal within the same area, or under the same body of syrup. In the figure, for instance, a sugar pan, seven feet long, is supposed to have its bottom formed of sheet copper fourteen long, shortened by corrugation, or crimping into a length of seven feet.

These corrugations may consist of angular or curvilinear channels, the latter being, in my opinion, preferable for the bottom of a sugar pan, especially when the curvature approaches to the parabolic. A like corrugation might also be given to the sides of the pan as high up as the action of the liquid bath extends. The line of these corrugations may be either straight or curvilinear; the principle of their formation being to amplify and stiffen the metallic lamina that constitutes the lower portion of the sugar pan, and to afford channels for the ready escape of the steam of the saline bath, which, acting on a flat bottom, is apt to cause concussions during ebullition, and to obstruct more or less the intimate contact of the heating bath, with the metal of the sugar pan.

The most efficacious heat of the chloride of calcium solution bath for evaporating syrups, I find to be 280 degrees of Farenheit's scale, though other temperatures, both above and below that point, may with safety be applied; Y, Y, shew the line of screw bolts, by which the flange of the copper or interior pan may be secured to the flange of the iron or exterior pan; the former flange being turned outwards in the figure, and the latter flange inwards.

The final discharge of the syrup along the channels, may be accelerated by the use of the rake represented in fig. 4, the knobs or fingers of which are formed to suit the corrugations, and are covered with a cloth glove. The relative positions of the thermostatic mechanism, and of the several pipes represented in the accompanying figures, may be varied without inconvenience to the process of sugar boiling.

I claim as my invention the combinations of apparatus above described, for evaporating syrups and saccharine juices by the heat of a saline bath, composed of a strong solution of chloride of calcium or acetate of soda, which boils at a temperature considerably above the boiling point of water; and I further claim the application of one or other of the said saline solution baths to sugar pans, with corrugated bottoms, or corrugated bottoms and sides.—[*Inrolled in the Rolls Chapel Office, March,* 1832.]

Specification drawn by the Patentee.

To **James Slater,** *of Salford, in the county of Lancaster, bleacher, for his invention of certain improvements in the method of generating steam or vapour, applicable as a moving power, and to arts and manufactures, and also for improvements in vessels or machinery employed for that purpose.*—[Sealed 2d April, 1831.]

My said improvements in the method of generating steam or vapour (which steam or vapour is applicable as a moving power, and to arts and manufactures), consists in the means hereinafter described, for causing that smoke, heated gas, and unconsumed air, which proceeds from the flues of the furnaces by which steam boilers are heated, (and which smoke, heated gas, and unconsumed air, after quitting contact with the external surface of the boiler, is usually allowed to pass up the high chimney, and to dissipate in the open air all the heat which it carries with it), to communicate a portion of the heat which it retains after quitting contact with the external surface of the steam boiler, to a current of fresh air, which after being heated or warmed by such communication, is conducted into the ash pit beneath the fire grate of the furnace, in order that it may rise up between the bars of the fire grate, and maintain the combustion of the burning fuel upon that fire grate, whereby, according to this part of my improvements, the combustion will be maintained by a current of warm or heated air (instead of cold air as usual), the heat and warmth being given to the said air (whereby the combustion is maintained) by abstracting and saving a portion of the heat which is usually carried off in waste, along with the current of smoke, heated gas, and unconsumed air, which passes up the chimney.

And further, a regulated portion of the said current of heated or warmed air is to be admitted into the furnace or fire place above the fire grate, in order to mix with the smoke which is evolved by the burning fuel, in such quantity, and at such parts of the furnace, and at such times, as will best facilitate the complete combustion of the said smoke, in the same manner, and for the same purpose as the air of the atmosphere in its ordinary state has been heretofore admitted into furnaces for burning smoke: except that instead of cold air, this part of my improvements is to admit air which has been heated or warmed as aforesaid by abstracting and saving a portion of the heat which is usually wasted in the current which escapes from the chimney.

And further, my said improvements in vessels or machinery employed for the purpose of generating steam or vapour (which steam or vapour is applicable as a moving power, and to arts and manufactures), consists in the following new additions to the flues wherewith steam boilers are usually provided, which additions are suitably arranged for the purpose before explained, of communicating to the current of fresh air, whereby the combustion of the burning fuel is to be maintained, a portion of the heat which is usually carried off in waste along with the current of smoke, heated gas, and unconsumed air, which escapes up the chimney.

The said new additions are a series of long passages for the conveyance of the smoke, heated gas, and unconsumed air, from the time that the same quits contact with the external surface of the boiler, which for distinction I will call smoke passages; they are made of thin iron plate, and are disposed in parallel courses with intervals between them, which intervals form passages for the conveyance of the current of air, whereby the combustion of the burning fuel is to be maintained.

The said air passages and smoke passages are regularly interspaced (one set of passages between the other set), in order that the current of smoke, heated gas, and unconsumed air, as soon as it quits contact with the external heating surface of the boiler, and has ceased to give heat to the water or to the steam therein contained, may be split and divided into several parallel streams, in order to pass along the smoke passages aforesaid; and in so passing, the said current of smoke communicates the superabundant heat which it contains to the current of air which is passing along the air passages aforesaid, which air, disposed alternately amongst the smoke passages, one set of passages being regularly interspaced between the other set of passages, in order that the currents of smoke, and of air, may be both subdivided into small streams, and that those small streams may be so interposed, one amongst the other, as will (without allowing of any actual intermixture of the smoke with the air), cause the redundant heat of the smoke to pass through the thin iron plate whereof the passages are composed (and whereby the smoke is kept from actually mixing with the air), so as to cool the smoke which is passing through the smoke passages, and give warmth or heat to the air which is passing through the air passages. And the said cooling of the smoke, and heating of the air, is rendered very complete by causing the currents of air to move along the air passages in a contrary direction to that in which the currents of smoke move along the smoke passages; for by thus reversing the directions of the two currents, the fresh air is taken from the air of the atmosphere into the air passages, at the further end of the parallel courses of interspaced smoke, and air passages, which end is most remote from the furnace, and from the boiler; and the fresh air so taken in is qualified by its coldness to absorb some remaining heat from the current of smoke, gas, and unconsumed air, which is flowing through those remote ends of the smoke passages, although the said current in the smoke passages, whilst flowing along the earlier parts of the said passages, has previously communicated the greater part of its superabundant heat to preceding portions of the current of air; and although the smoke has become cooled by such communication of heat As the air which is thus taken in at the ends of the air passages, flows along the same, in its way towards the furnace, it absorbs more and more heat from the smoke in the smoke passages, and becomes more and more heated thereby; but nevertheless it continues to be qualified to absorb still more heat from the smoke, heated gas, and unconsumed air; because, as the air advances along the air passages, it comes opposite to those parts of the smoke passages which are nearer to the furnace, and through which parts hotter smoke is flowing.

The said arrangement of the interspaced smoke passages, and air passages, to conduct currents of smoke and air, one amongst the other, with motion in contrary directions, in order that the air may absorb heat from the smoke, is on the same system as is commonly practised in what are called French air stoves, for heating air to warm halls, and stair cases of houses; and part of my said improvements in vessels and machinery for generating steam or vapour, consists in the aforesaid application and adaptation of that system of smoke passages, and air passages, for the purpose of warming or heating the air wherewith the combustion of the fuel is to be maintained in the furnaces of steam boilers. The warmth or heat given to the air being derived, as before mentioned, from that heat which is usually carried off in waste, along with the current of smoke, heated gas, and unconsumed air which passes up the chimney; and in lieu of a high chimney I employ a revolving fanner turned by machinery, to produce an artificial draft or current of air, because by abstracting heat as aforesaid from the current of smoke, gas, and unconsumed air, the same will be too much cooled to enable it to ascend in a high chimney with that rapidity which will create a sufficiently rapid current, or draft of smoke, gas, or unconsumed air, through the aforesaid smoke passages, and through the ordinary flues of the boiler, and also a corresponding current of fresh (but warmed or heated) air through the burning fuel on the fire grate, and through the aforesaid air passages.

The said revolving fanner may be constructed in a similar manne to those commonly used for blowing air for ventilating, or melting furnaces, and which have been, in some instances, applied to produce a draft for the furnaces of steam boilers, being turned rapidly round by the power of mill work or by the steam engine, and so applied and placed at the ends or terminations of the smoke passages, as to draw out the smoke, gas, or unconsumed air therefrom, and thereby cause a rapid current to pass through these passages, and through the flues of the steam boiler, and consequently to draw a current of fresh (but warmed or heated) air through the burning fuel on the fire grate, and through the air passages aforesaid.

Note.—The ash pit, or space beneath the fire grate, must be inclosed on all sides, to cut off the communication with the open air, and the warmed or heated air must be brought to the ash pit, through a suitable trunk or flue, from the aforesaid air passages, at that end thereof which is farthest from the entrance for the fresh air, but which end is the commencement of the smoke passages, where they split and divide off from the end of the ordinary flue of the steam boiler. The several air passages are united at the said end into one passage or trunk, which is to convey the warmed or heated air from them into the inclosed ash pit, as aforesaid, beneath the fire grate. The furnace or space wherein the fire is contained, is inclosed on all sides, and has a fire door in front, which shuts close in the usual manner, and which can be opened when required to give access to the fire; but in order to avoid the labour of throwing on coals, and interruption to the draft by opening the door, it will be best to throw on the coals by machinery, consisting of two revolving fanners, on Mr. John Stanley's patent plan, which is now very commonly practised, and is well known.

And as to the admission of a portion of the heated or warmed air into the furnace above the fire-grate, as before stated, for the purpose of burning the smoke, I introduce the same partly through a narrow cleft, which extends horizontally all across the width of the furnace, immediately over the fire door, so as to throw a horizontal sheet of warmed or heated air over the whole surface of the fire, in the same manner as has been heretofore done with cold air, in order that it may mix with the smoke which is evolved from the burning fuel, and supply oxygen for the combustion of that smoke. And whereas that combustion will not take place, unless a sufficiently high temperature is maintained in that part of the furnace where the mixture of the air and the smoke is effected, the quantity of air so admitted must not be so great as to cool, and lower down the temperature of the mixture of smoke and air, below that temperature at which the combustion thereof will take place; but according to my improvements, the air being warmed or heated before it is admitted, instead of being cold, as heretofore practised, a greater quantity may be admitted without cooling the mixture of air and smoke too much, and a more prompt combustion of the smoke may therefore be obtained; and because the whole quantity of air requsite to burn all the smoke, cannot in all cases be admitted at the said narrow cleft over the fire door, I introduce a further portion through another cleft or opening, which extends across the fire bridge, and which discharges the warmed or heated air, in an ascending sheet (in the same manner as has heretofore been done with cold air), in order that it may mix with the current of smoke which is passing over the top of the fire bridge, and complete the burning of all the smoke which may have escaped combustion from the admixture of the air that is admitted over the fire door, as above mentioned; and by regulating the admisssion of the warmed or heated air through the two apertures as aforesaid, the smoke may be consumed with more certainty, and advantage than has been heretofore done by admitting cold air, in a similar manner, because an abundant quantity of the warmed or heated air may be admitted according to my improvement, to ensure the complete burning of the smoke, without cooling and reducing the temperature within the furnace too low for the combustion to take place: but on the contrary, that cooling and lowering of the temperature, within the furnace, which results from admitting an ample supply of warmed or heated air above the fire grate (in order to ensure the complete burning of all the smoke) is beneficial in moderating the intensity of the heat, which strikes against the metal of the boiler immediately over the furnace, but such a supply of warmed or heated air will not lower the temperature within the furnace, too much to impede or prevent the complete combustion of the smoke (as an equal supply of cold air would do), and the flame arising from that combustion, acts beneath the boiler in the flue thereof beyond the fire bridge with great effect to produce steam; and hence, although there will be a less intense heat in the furnace, by virtue of my improvement, of admitting warmed or heated air therein, there will be much more heat in the flue beyond the fire bridge, so as to increase the useful effect of the fuel, by burning the smoke arising from it, which has not been the case in the mode hitherto practised of admitting cold air. And, in addition to the revolving fanner before mentioned, for drawing a current through the smoke passages, another such revolving fanner may be applied at the entrance of the air passages; in order to assist the draft by forcing the cold atmospheric air, to enter into and advance along the said passages, or in the case of high pressure engines, which discharge their steam into the open air, after it has operated on the piston, the said steam may be blown through a small spout, in a vertical jet, with a sudden blast, up the centre of a low chimney pipe, in order to cause a draft therein, in the manner now generally practised in locomotive engines, for quick travelling on railways; and the lower end of that chimney pipe, communicating with the smoke passages, will cause a current through them, and if such current is not sufficient to produce the requisite draft through the fire, and the air passages, a revolving fanner may be applied in addition, to force air as aforesaid into the commencements of the air passages; or in lieu of revolving fanners, any other description of blowing machinery may be used, which is suitable for blowing furnaces.

And for the more complete explanation of the manner of performing my said invention, I have hereunto annexed two sheets of drawings, which represent a boiler for generating steam, or vapour, constructed with an internal furnace and flues, and containing the additional parts to cause it to operate according to my improvements. Plate I, fig. 5, is a vertical longitudinal section, through the whole length of the boiler; fig. 6, a horizontal section of the same boiler, taken through the internal furnace and flues; figs. 7, 8, and 9, are vertical transverse sections, taken across the same boiler, at different parts of the length thereof; namely, fig. 7, across the furnace and fire grate; fig. 8, across the internal flues and the smoke and air passages near to the middle of the length of the boiler; and fig. 9, is taken across the air and smoke passages looking toward the furnace; A, A, B, B, C, C, is the outside of the boiler; D, D, F, F, is the internal furnace contained within the lower part of the boiler; E, E, is the fire grate, dividing the interior of the furnace into two parts; namely, an under part F, F, for the ash pit, and an upper part D, D, for the fire place; K, K, is the fire bridge at the far end of the grate, and L, an inverted fire bridge, beyond the common bridge—both are hollow to receive water within them; G, G, are the internal flues, extending five times along the length of that part of the boiler, which is beyond the furnace part, as is shewn in fig. 6. The flues join to the furnace at one end, and the opposite end joins to an internal chamber H, from which a chimney pipe I, passes horizontally through to the outside of the boiler, and is connected with the case of a high chimney, to cause a draft in the usual manner, in order to get up the steam when the boiler is first set to work, and when the revolving fanner is out of action: the operation of the boiler being then the same as that of other boilers in common use; and all my improvement being out of action, every part of the internal furnace and flues, is surrounded by the water contained in the boiler, in the same manner as is commonly practised for boilers on board steam vessels; L, L, is Stanley's fuel feeding apparatus, for throwing the coals on the fire grate E, E; it operates by means of two revolving fanners, fixed on the lower ends of two upright axes, which are turned rapidly round by the machinery. The coals are put into a hopper, which has a pair of revolving rollers at the lower part of it, to crush the large lumps of coal and reduce them small enough for the revolving fanners (on which the coals fall after passing through the rollers) to throw the coals forwards on to the fire grate.

The construction of this apparatus is so well known, as to require no farther description. In order to preserve the bars of the fire grate E, E, from burning by the heat of the fire, hollow iron tubes may be used for fire bars, and the water with which the boiler is fed, being forced to run through the hollow tubes, will preserve them from the effects of the heat, and the water will become heated before it enters the boiler; M, is the feeding cock or valve, which is opened or shut as is required, by a wire from the float N, within the boiler, according to the height at which the water stands therein. The water is forced by the feeding pump of the steam engine, through the cock M, whenever the same is opened (by the subsidence of the float N), and thence the water is conducted by the pipe O, to the hollow bars of the fire grate.

Note.—when the cock M, is shut, by the using of the float N, (and the passage of the water through the pipe O, is intercepted), the water which continues to be forced by the feeding pump, makes its escape from the pipe leading from the pump to the cock M, through a loaded safety valve, which the water lifts up whenever it is too strongly forced. The construction of the fire grate with hollow bars for water is explained by the drawing at H, wherein figure 10, is a horizontal plan, and figure 11, a longitudinal section, and figure 12, a transverse section, drawn to a larger scale than before The pipe O, figure 5, joins to a projecting branch P, of a square hollow trunk Q, which extends horizontally across the furnace, and forms the front end of the fire grate; and R, is a similar trunk, which forms the opposite or farther end thereof; S S, T T, V V, are the fire bars, formed by hollow tubes of wrought iron, welded in the manner of gun barrels or gas pipes, and screwed at their ends, to join them to the two square trunks R, and Q. These trunks have partitions across them internally, to compel the water to flow through the bars in pairs, backwards and forwards alternately, by a zig-zag course, namely, first backwards from Q to R, by the bars S, S, and then returning through the bars T T, from R to Q, then backwards again from Q to R, by the next pair V V, and so on until the last pair of bars, which join to the trunk R, near to the opposite corner of the fire grate, to the entrance lanch P. The branch X, joins to the fire bridge K, at the lowest part thereof, in order to introduce the water into the boiler at that part; but by flowing through the hollow bars, the water becomes considerably heated; and in order to prevent the formation of steam within the hollow bars (which steam, by displacing the water therefrom, might allow them to get hot), a nozzle or valve box may be applied in place of the branch X, with a valve therein, opening towards the boiler, in the direction in which the water is required to flow through the branch X, and the stem of the said valve coming through a stuffing box to the outside, within the ash pit, is to be loaded with a weight, which will tend to close the valve, and oppose the flow of the water through the same, and consequently through the hollow bars of the fire grate, until the pressure of the water is equal to lifting the said loaded valve.

The said valve being properly loaded, will retain the water which is flowing through the hollow bars, under such a degree of compressure therein as will restrain the same from expanding into steam, although the water so retained may acquire a higher temperature than that of the water in the boiler; but when the said heated water enters into the boiler, and mixes with the water therein, it will communicate thereto the extra heat which it has brought from the fire bars; and by so bringing away heat from the bars, they will be preserved from injury.

Note.—The said loaded valve may be placed on the orifice of the branch X, within side of the boiler, if there is a convenient space for its reception, and then a stuffing box for the stem of the valve will be unnecessary; Y, figure 5, represents the narrow cleft or opening over the fire door, where a portion of air is admitted into the fire place, in order to burn the smoke, as before-mentioned; that air is brought by a horizontal square trunk, which extends horizontally across the front end of the boiler, and the admission of the air into that pipe is regulated by a register within the pipe in the usual manner. The fire bridge K K, is made hollow within, to introduce a current of air, which enters at the end of the fire bridge, through the side of the boiler, and the air is allowed to rise up through an opening Z, at the top of the fire bridge, in order to complete the burning of the smoke, as before-mentioned. The quantity of air which is allowed so to pass up over the fire bridge is regulated by a turning valve W, situated in the hollow within the fire bridge K K; *a a*, is the revolving fanner, by which a current is produced through the flues, instead of a high chimney, that is after the steam is got up and the engine is set to work, for previously to that the chimney pipe I, and a high chimney is used, as already mentioned; but when the fanner *a, a,* is put in motion by the machinery (which also turns the fuel feeding apparatus L, L,) the communication between the chimney pipe I, and the high chimney is shut, by letting down a sluice damper of the ordinary construction, and then my improvements are put into action. In figs. 5, 8, and 9, 1, 1, 2, 2, is an iron case, containing the system of smoke passages and air passages before mentioned; the case is represented in the drawing as placed at the top of one end of the boiler, over the flues G, G, and as if it were fitted into a space left for it at the top part of the far end of the boiler, in order that it may occupy the least possible room; but there is no necessity for placing the case containing the smoke and air passages in that particular position; and if there is room in the situation where the boiler is to be placed, it will be better to turn the case round end for end, and place it beyond the end of the boiler, the top of which may then be made to rise to its full height, nearly all its length, as usual, in order to receive the steam which is generated from the water.

The smoke heated gas and unconsumed air which has passed through all the course of the internal flues G, G, which are immersed in the water of the boiler, and arrived at the chamber H, enters from the top of that chamber into openings through the bottom of the case 1, 1, 2, 2, at the far end of that bottom, as is shewn at 5, 5, 5, fig. 9, where fifteen such openings are represented. They convey the smoke upwards into the ends of as many parallel smoke passages 7, 7, which are represented white in the drawing; they are formed by thirty thin plates of iron placed edgewise upwards, parallel to each other, and extending all the length of the case 2, 2, as is shewn in fig. 5.

The said vertical plates (including the two outside plates of the case 1, 1, 2, 2,) also form sixteen air passages 8, 8, in the intervals between the fifteen smoke passages 7, 7, which air passages also extend all the length of the case 2, 2, side by side of the smoke passages, and interspaced between them.

The said vertical plates form the separations between the smoke passages and the air passages; and by the thinness of the metal, they allow the heat to pass from the currents which are passing upwards through the smoke passages, to those which are passing downwards through the air passages, without allowing the smoke to mix with the air.

The said vertical planes which thus form the separations between the two sorts of passages, are about eleven inches broad, and eight and a half feet long; they are bended along one of their margins, so that their transverse sections, when finished, will be as represented in fig. 13. The broad part *e*, forms the upright partition between the adjacent passages; the bended edge *f*, forms the top of the passage as well as the bottom of the passage next above. The small rebate, into which the bended angle is formed at *k*, receives a corresponding bended rebate at the extreme edge *l*, of the plate; and when a row of partition plates are put together, side by side, to form one tier or story of passages, the rebates *k*, and *l*, leave a row of parallel grooves over the joints between the plates, extending all the length of the case, and those grooves receive the lower edges of a set of similar partition plates, to form another story or tier of passages over the others. The passages, when the plates are put together, are nine inches and a half high, by one inch wide. The injunctions between the edges of all the plates are filled with fire clay, or other suitable cement.

In this way the said partition plates are put together, side by side, and one set above another, until six stories in height of air passages and interspaced smoke passages are completed. At one end of each horizontal range of passages, the passages communicate by openings at the top of them, with the passages immediately above them; and at the opposite ends of the same horizontal range, the same passages communicate by other openings with the passages immediately below them, and thereby each series of smoke passages forms an ascending zig-zag course—14, 15, 16, 17, 18, 19, fig. 5, of passages rising one above the other, as is shewn by the arrows in that figure. The upper ends of all the smoke passages join at 20, into one cross passage, which unites them, and which extends with two bends to join to the central apertures of the cylindrical case for the revolving fanner *a, a,* which, when in motion, draws a current through all the smoke passages, each of which makes an ascending zig-zag course, as represented at 14, 15, 16, 17, 18, and 19, in fig. 5, passing six times the length of the case; and there are 15 such courses, side by side, in parallel vertical planes.

The intermediate spaces between them are the air passages which run in similar zig-zag courses, but reversed in direction; the common entrance to all the air passages being at 21, at the upper part of the farther end of the case, they take in the air of the atmosphere at 21, and convey it by descending courses, between the ascending courses of the smoke passages, until the air passages all open at their lowest and farthest ends into a passage 22, which extends horizontally across the width of the boiler. The openings into it are at the bottom side of it, as shewn at fig. 9, so that the heated air rises upwards into the cross passage 22, the end of which joins to a trunk 23, which extends along the side of the boiler, in the descending direction shewn by the dotted lines in fig. 5, and as is shewn in the plan fig. 6, and transversely in figs. 7, 8, and 9. The end of the trunk 23, communicates with the ash pit by an opening 24, fig. 5, and fig. 7, to convey the heated or warmed air beneath the fire grate; and also the end of the trunk 23, communicates at 25, fig. 6, with the cross passage I, fig, 5, which admits a portion of heated air into the furnace, over the fire door; and there must be a register in the passage to adjust the efflux of air. And, lastly, the same air trunk 23, communicates at 26, fig. 6, with the air passage which conveys another portion of heated air into the hollow fire bridge K, and the efflux of which air through the opening Z, at the top of the bridge, is regulated by the turning valve W.—*Inrolled in the Rolls Chapel Office, October,* 1831.

Specification drawn by the Patentee.

To GEORGE OLDLAND, *of Hillisley, in the parish of Hawkesbury, and county of Gloucester, clothworker, for his having invented or found out certain improvements in the machinery or apparatus for shearing and dressing woollen cloths and other fabrics.*—[Sealed 22nd July, 1830.]

THESE improvements in machinery or apparatus for shearing and dressing woollen cloths, consist, first, in the construction and adaptation of a peculiar kind of cutting instrument, never before employed in or adapted to a machine for shearing or cropping the pile from woollen cloth, which cutting instrument is formed by discs of steel or other hard metal; or it may be hollowed out resembling a cup, the circular edge of which is intended to act against a thin bar or ledger blade, and being made to revolve upon a metal spindle, and to traverse to and fro against the edge of the ledger blade, will when thus put in action produce the effect of shears, by cropping the pile of the cloth which is brought against it; secondly, in the adaptation of a frame or frames, handles or holders, containing teasles or wire cards, or brushes, or any other suitable material for dressing cloth, which frames, handles or holders, are to be brought against the face of the cloth under operation for raising the pile, and there made to revolve on a metal spindle, or by any other convenient means which are intended, by a circular movement of the point of the teasles, wires, brushes, or other materials, to draw out the fibres of the wool, or in other words, to raise the pile of the cloth crosswise, that is in the direction from the middle towards the lists.

These improved instruments or implements for shearing or cropping, and also for dressing and raising pile on woollen cloths, I bring into effective operation by mounting them with suitable standards and framework for driving, with beds, rollers, and other appendages for supporting and adjusting the cloth intended to be operated upon, and for bringing the cloth forward by similar means to those heretofore commonly employed in shearing and dressing machines for the like purposes. It is therefore to be understood that I do not claim the construction of such machines except in regard to the adaptation of my improved cutters, frames, handles, or holders, and avail myself of any form or construction of machine to which the said improved cutters, frames, handles, or holders, may be found applicable for the aforesaid purposes.

Plate II. fig. 1, represents one of the disc cutters seen edgewise bearing upon the ledger blade; fig. 2. is a top view of the same; and fig. 3, is the under side of the disc cutter, the central part *b*, being excavated, making the cutter cup shaped. To the centre of this disc on the upper side a spindle is affixed, for the purpose of allowing it to revolve when mounted in the shearing frame, as shewn in the two following figures.

This disc cutter may be of hardened steel, or perhaps some other hard substance may answer the purpose nearly as well, and about two and a quarter inches in diameter. The edge of the disc is to bear upon the edge of the ledger blade, covering it about a quarter of an inch more or less, as represented at fig. 2, when it will be seen that the edges of the cutter and the ledger blade form acute angles like the two blades of shears; and if the cutter be made to revolve rapidly and to transverse to and fro, the pile of the cloth, that is, the fibres of the wool standing up, being caught in the angle between the ledger blade and the cutter, will, as the cutter moves onward, be cropped or shorn off.

Fig. 4. is a front view of a shearing frame or machine, in which a series of these disc formed cutters are mounted; and fig. 5, is a transverse action of the same. These two last mentioned figures are exhibited merely for the purpose of shewing a convenient mode of adapting the said cutters, and of bringing them to act upon the face of the cloth, but the Patentee does not confine himself to the particular construction of the machine shewn. It is therefore to be understood that the peculiar construction of the machine forms no part of the invention claimed.

The main rotary shaft *a*, *a*, is drawn by a band and rigger as usual; *b*, *b*, is the ledger blade, a thin plate of steel extending along the frame, fastened by screws to the ledger bar, and suspended in the same way as in some other shearing machines already in use; *c*, *c*, is the bed, a smooth edge of iron extending along the machine, over which the cloth passes to be shorn ; *d, d, d,* are the disc cutters. To each of these a spindle *e, e, e,* is affixed as above said ; *f, f,* is a moveable carrier frame, in which the spindles of the cutters are mounted with adjusting screws and springs at top, to bring all the cutters to their proper bearings upon the ledger blade.

Upon each of the spindles a pulley is fixed, and a tight cord passed round them in the manner of a drill bow, for the purpose of giving the spindles and their cutters a rotary motion, when the carrier frame moves.

The carrier frame *f, f,* is mounted in grooves in the standards *h, h,* affixed to the ledger bar, and in these grooves the frame *f, f,* slides to and fro. This frame is elongated toward the right hand end of the machine at *g,* for the purpose of allowing it to be acted upon by a spiral or cam wheel *k,* affixed to the end of the main rotary shaft. As the main rotary shaft revolves, the rib or spiral-tooth cam formed round the periphery of the wheel *k,* taking into the groove at the back of the sliding frame shewn by dots on *i,* causes the sliding frame *f, f,* to traverse to and fro, and the cord passed round the pulleys being drawn tight and made fast at each end to stationary arms *l, l,* fixed to the standards *h, h,* the pulleys with the spindles are by the tight cord made to revolve rapidly, and thus by the traversing of the frame to produce the alternating rotary action of the cutters which crops the pile off the cloth.

The above method of actuating the cutters by a cord and pulleys, is adopted because it is found to be effective, but the Patentee does not confine himself to that particular mode of driving the cutters, as the same movement might perhaps be produced with equally good effect by a rack and pinions, or by some other means.

It is unnecessary to describe particularly the manner in which the cloth is brought forward, the bed and the ledger blade adjusted, and the other part of the machine constructed, as the same will be fully understood by the drawing, and is well known to mechanics conversant with shearing machinery.

The frames, handles, or holders, to contain these teasles, wire cards, or other suitable materials, for raising the pile of woollen cloths, are constructed in a similar form to the cutters above described, that is in circular frames or discs, which are intended to revolve by means of the central spindle affixed to each, and when mounted in a convenient frame, and driven round, cause the teasles, wire cards, or other suitable materials, to raise the pile of the cloth submitted to operation.

Figs. 6, 7, and 8, represent the frame handle or holder containing teasles, as it would appear in different positions. It is proposed first to construct a frame of pieces of wood *a*, *a*, *a*, fig. 6, connected together by rings of iron *b*, *b*, with small arms, through which rivets, pins, or screws pass, for the purpose of holding the wood together; then introduce teasles *c*, *c*, *c*, in the manner shewn, by passing their stems or heads into grooves or recesses in the edge of the wood, and confine them in that situation, by a string bound round the external edge or periphery of the frame; which mode of fastening the teasles into the frames is much the same as the ordinary way of fixing them into rods or handles, but in this instance, as applied to the object, the frame is disc formed. If wire cards are employed, or any other suitable materials, instead of teasles, it is obvious that they must be fastened by some other convenient mode. It is only necessary to say, that they must be placed in the same position as the teasles shewn in fig. 6, and on disc formed frames, at equal distances from the centre.

When these frames are charged with the teasles, or other suitable material, they are te be attached to a circular carrier *d*, by staples, or otherswise, and then mounted in a suitable machine.

The construction of a machine which is found convenient for this purpose, is shewn at fig. 9, a front elevation; fig. 10, an end view; and fig. 11, a plan, or horizontal representation of the same: *d, d,* are the circular carriers, about 16 inches in diameter, the frames, handles, or holders, with the teasles or wires, being placed in them. These carriers have each a spindle *e*, affixed to the centre of their upper surface, which spindles being mounted in the machine, as shewn, are made to revolve by means of a bevel gear, or may be driven by various other means.

The cloth to be operated upon, is to be stretched over the bed *f*, extending the whole breadth of the machine, and to be progressively drawn forward by means of rollers, in a similar way to that usually employed in brushing machines. The bed is suspended upon weighted levers *g, g,* by which the face of the cloth is kept up against the surface of the teasles, and as they revolve, the pile or wool is raised in a segment direction, crosswise of the cloth, that is, from the middle towards the lists.

It is necessary that the bed should be formed of some elastic material, in order to give free action to the points of the teasles or wires. The Patentee therefore finds it desirable to employ, in connection with this mode of raising the pile of woollen cloth, a row of fine needle points or heckles, shewn at *k*, which he causes to move a little distance up and down, by means of the crank and rod *i*, fig. 10, and also laterally to and fro, by means of a cone and fixed tooth *k*, fig. 10 and 11; this contrivance is called a pioneer, and is designed to draw out the fibres of the wool, previously to the face of the cloth coming under the operation of the teasles or wires, in the disc raiser.

The Patentee concludes, by saying—" I have exhibited in the drawing this machine, merely for the purpose of shewing the method of bringing my rotary disc-formed teasle frames or raisers into operation upon the face of woollen cloth, for the purpose of raising the pile. I do not however claim its particuliar construction, or confine myself solely to its employment, as my improved rotary teasle frames or raisers, might be conveniently put in operation in various other constructions of machinery, and answer the purpose, perhaps, equally well. Lastly, I wish it to be observed, that though I have described my improved cutter as of a disc or circular form, turning upon a central spindle, and which I consider to be the most effective for the operation of cropping or shearing the pile, yet if any slight variation of form should be suggested by any other person, such as an elliptical or poligonal formed cutter, bearing upon the ledger blade, and turning upon a central spindle, in imitation of the mode above described, I shall consider the same to be an infringement of my present invention. And as respects the disc-formed teasle frame handle, or holder, for raising the pile of the cloth, the same remarks must apply, as the said holder may be slightly varied in form; but if made to turn upon a central spindle, as described, I shall consider it to be an imitation of my said invention."—[*Inrolled in the Rolls Chapel Office, January*, 1831.

Specification drawn by Messrs. Newton and Berry.

To Edward Riley, *of Skinner-street, Bishopsgate-street, in the county of Middlesex, brewer, for his having invented certain improvements in the process and apparatus for fermenting malt and other liquors.*—[Sealed 19th July, 1830.]

The apparatus which forms the subject of this Patent, is designed principally to promote the rapid fermentation of worts, which it is said to be capable of effecting in a much more complete manner than the ordinary mode employed by brewers.

Plate II, fig. 12, represents the apparatus as it would appear in section, taken vertically nearly through the middle; *a, a, a,* is a close vessel, divided about half-way up by a horizontal partition, in the middle of which there is an aperture *b*; in the lower compartment of this vessel at *c*, the wort is to be placed while under fermentation, and in the upper compartment a rotary fan *d, d*, is mounted upon a horizontal axle *e*.

In the top of the vessel an aperture *f*, is made, which is to be closed by glass, so as to render the vessel air tight, and allow of the process being occasionally observed from without.

When the vessel is to be charged for working, the aperture *g*, must be opened, and the wort and also the yeast poured through it into the upper compartment; the air valve *k*, being open also. The apertures *g*, and *k*, being afterwards closed, the fan is put in rotary motion for the purpose of mixing the wort and yeast completely together, which, when done, the mixture is to be allowed to pass down through an opening at *h*, in the middle partition, into the lower vessel.

The vessel being thus charged, the fermentation goes on, and the yeast rises through the central aperture *b*, and flows over into the upper compartment. The pump *i*, is now to be employed, by which wort is to be drawn from the lower compartment and thrown into the upper one, in order that the overflowing yeast may be again mixed with the wort by the rotary fan, as before. The wort is then to be let down again through the aperture, into the lower compartment, and the fermenting process allowed to proceed. In order to further assist the operation, an outer vessel may be employed to suround the vessel *a, a,* which may contain warm or cold water, as the season of the year may render necessary.

By thus occasionally pumping up supplies of wort, and mixing that and the yeast together by means of the rotary fans, the process of fermentation will be greatly promoted, and the wort be much more perfectly and completely acted upon throughout its volume, than by the ordinary mode of fermenting liquors.—[*Inrolled in the Inrolment Office, January,* 1831.]

To SAMUEL LAMBERT, *of Regent-street, in the parish of St. James, Westminster, in the county of Middlesex, gold-lace-man, in consequence of his having received a communication from a certain person residing out of our dominions, by which he is in possession of the knowledge of an invention, being an improvement in throstle spindles for spinning and twisting silk, cotton, wool, flax, and other fibrous substances.*—[Sealed 2nd June, 1831.]

THIS improvement is explained by the several figures referred to in Plate II. Fig. 13, represents the spindle and its appendages in section; fig. 14, is a geometrical representation of the same; and figs. 15 and 16, display the pieces separately by which the peculiarities of construction in any of the parts will be seen; reference being made to the same parts by similar letters in all the figures.

The central spindle, represented by *a,* is made of steel, or other fit metal, having a hole drilled centrally in the direction of its axis, from the upper extremity of the spindle to the depth of about three inches, as shewn in the section. The spindle being of suitable dimensions, according to the thread which is intended to be spun, is to be fixed by its lower extremity to the spindle rail or other part of the machine.

The perforation in the spindle is intended to receive a pin *e*, of steel, or other metal, fitting into it so as to allow the pin to rotate freely, but without shaking in the hole. The pin has near its upper end a screw thread, upon which the nut of the flyer *f*, is screwed till it comes in contact with the shoulder of the pin, and between the shoulder and the top of the spindle, a collar or washer of leather is interposed.

The spindle being firmly fixed, the bobbin *b*, is made to turn upon it, and it receives this motion by bearing upon the warve or pulley *c*, also turning. The spindle being fixed, the bobbin *b*, is made to turn upon it, and this motion is given by its bearing upon the warve or pulley *c*, which also turns upon the spindle. The warve is driven by a band passing round it, and round the spindle drum as usual.

The warve has a tube of metal, about two inches and a half long, attached to it, and passing through it centrally, over which the bobbin is placed, bearing upon the upper concave surface of the warve, into which is fixed a catch pin, intended to take hold of a similar pin in the hollow at bottom of the bobbin.

Below the warve *c*, upon the spindle, is placed a simple loose pulley *d*, upon which the driving band may be slipped, when it is necessary to stop the motion of the bobbin. The warve *d*, with or without the intervention of a washer, rests upon the bobbin board or rail *g*, of the rising frame (commonly called the copping rail.)

The thread receives its twist by the rotation of the bobbin round which it is wound, and passing through one of the eyes of the flyer, describes in its course by its angular deflection, the side and base of a cone, and carries round with it the flyer and its central pin.

In this improved construction of the spindle for spinning machinery, there is no more strain upon the thread betwixt the delivery rollers and the bobbin than that which is necessary to overcome the friction of the flyer pin, in its socket, in the spindle; and that resistance being as nearly as possible uniform, the thread is not liable to be broken by occasional inequalities of pull, and therefore the interruptions being less frequent, and the consequent waste being diminished, the amount of work done by the machine will be in that proportion augmented.

Having now described the improved means of equallizing the strain upon the thread, as it passes from the delivery rollers, by detaching the flyer from the spindle, I do hereby declare, that the said invention consists in the method or means to be employed for that purpose herein before described. And I declare, that I claim as the invention referred to in the said letters patent, such detached flyer, moveable by the action of the thread in the process of spinning, and the perforated spindle in which the flyer pin turns. And I further declare, that I do not claim as parts of the said invention, any other parts of spinning machinery, as are in common use, herein adverted to, in describing the action of this improved spindle.—[*Inrolled in the Inrolment Office, Oct.* 1831.]

Polytechnic Intelligence.

FIRST REPORT OF THE PROCEEDINGS OF THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, ASSEMBLED AT YORK.

The appearance of this Report has put the scientific public in possession of the authorized account of what has been done by this very important society, and of what may be expected from its exertions,

We cannot but consider that the British Association has started under auspices the most favourable, and even the results of the first meeting, and the prospects of support which this Report displays, certainly exhibit a much greater step towards the fulfilment of a great series of objects requiring much time for their development than could possibly have been anticipated.

That the Association has already secured in its favour a great share of the best talent in the country, the list of members annexed to the Report will best testify; it is in every respect a most creditable phalanx of names. Fortunately, however, it is not upon names alone that its prospects of support must rest; the pamphlet before us contains pledges of exertion from some of the most active philosophers in the country, of a description which has been unattempted by any previously existing society among the many which this country possesses. There is no society, strictly scientific, which professes to direct the attention of its members, or of philosophers at large, to particular branches of knowledge, in which important progress might be made by a well directed system of mutual co-operation. Take, for example, the science of meteorology, in which observers have been so long at cross-purposes, and in which the very same amount of exertion, which has been thrown away upon forming registers utterly useless for want of information or combined exertion, might have been rendered available to the highest purposes of sciences. To this subject the Association has properly directed peculiar attention, and, it may be hoped, with the happiest results.

But there is nothing which strikes us with more admiration amongst the energetic proceedings of this infant institution, than the list of reports on the state and progress of the different sciences. This is a species of literature quite new in this country, and which will form a body of information really invaluable. The only approximation to it has been in the annual addresses of the President of the Geological Society upon that particular branch of science. These admirable discourses have only excited the wish that something more general, upon the same plan, should be attempted. The objects of these scientific reports will, we believe, be more varied and extended; and it is probable, that, for the first year at least, the style of execution of them will much depend upon the views and opinions of the individuals by whom they are composed,—until some formal plan shall have been sanctioned by usage for general adoption. Some account of the different labours of philosophers during a recent period of time, with a view of their bearing upon the past progress and future prospects of the sciences, will, we presume, be a general object of these reports; but we trust that in many of them more extended and philosophical generalizations will be taken; and in several sciences we do not know a more acceptable service that could be performed, than a correct estimate of the precise point to which our knowledge has arrived, and where precisely our ignorance begins. From this process some conclusion will naturally be drawn as to the line or lines which present the fairest points of attack upon the remaining strong-holds of science.

The names of those who have engaged to execute these useful labours in science include some of the most active philosophers in Britain; and we anxiously hope that nothing will deter those who have given this capital portion of the machinery of the Association the weight and sanction of their names, from fulfilling, in as full a manner at least as leisure will permit, the agreement to which they are in some measure pledged, and which will be valuable to science and to the Association, in proportion to the acknowledged eminence of their scientific character.

As we cannot but look upon this as one of the most important parts of the pamphlet before us, we shall insert the list of reports contained in the preface.

"1. The Rev. George Peacock has undertaken to present to the next Meeting, a Report on the recent progress of Mathematical Analysis, in reference particularly to the differential and integral calculus.

"2. Professor Airy has undertaken a Report on the state and progress of Astronomical Science, in reference particularly to Physical Astronomy.

"3. J. W. Lubbock, Esq. has consented to furnish such information respecting the data and desiderata for calculating the time and height of High-water as he may be able to offer.

"4. James D. Forbes, Esq. has undertaken to present a Report on the present state of Meteorological Science.

"5. Dr. Brewster has undertaken a Report on the progress of Optical Science.

"6. The Rev. Robert Willis has undertaken a Report on the state of our knowledge concerning the Phenomena of Sound, in reference especially to the additions recently made to it.

"7. The Rev. Professor Powell has undertaken a similar Report respecting the Phenomena of Heat.

"8. The Rev. Professor Cumming has undertaken a Report on Thermo-Electricity and on the allied subjects, in reference to the discoveries recently made in them.

"9. James F. W. Johnston, Esq. has undertaken a Report on the recent progress of Chemical Science, especially in foreign countries.

"10. The Rev. Professor Whewell has undertaken a Report on the state and progress of Mineralogical Science.

"11. Robert Stevenson, Esq. has undertaken the Report recommended by the Geological and Geographical Committee, on the waste and extension of the land on the East coast of Britain, and on the question of the permanence of the relative level of the sea and land.

"12. Professor Lindley has undertaken to give an account of the principal questions recently settled, or still agitated, in the Philosophy of Botany."

No less than six of these twelve reports are to be contributed by eminent members of the University of Cambridge,—a circumstance certainly highly indicative of the warmth of feeling of that great body towards the objects of the British Association, as well as giving a pledge for the ability of the works thus undertaken. The former distinguished professor of mineralogy at Cambridge was among the earliest supporters of the plan, to which he alluded in a letter communicated to the York Meeting, an extract from which is given in Mr. Vernon Harcourt's address. "A collection of reports," he says, "concerning the present state of science, is on all accounts much wanted; in order that scientific students may know where to begin their labours, and in order that those who pursue one branch of science may know how to communicate with an inquirer in another. For want of this knowledge we perpetually find speculations published which show the greatest ignorance of what has been done and written on the subjects to which they refer, and which must give a very unfavourable impression of our acquirements to well-informed foreigners."—Report, p. 29.

The Report is divided into three distinct portions, as the title-page indicates. The first contains the Proceedings of the Meeting towards the constitution of the Permanent Body or Association which sprung from it, and the subsequent arrangements necessary to its complete constitution. The second part embraces the Proceedings of the general and the sub-committees appointed to carry into effect the objects of the Association, and which, it will be seen, were by no means limited to the week of the meeting at York. The third division contains the Scientific Transactions of the meeting at York, comprising the order and periods of the meetings, with abstracts of the papers presented. One communication, printed at full length, is the excellent Essay of Dr. Henry of Manchester, upon the philosophical character of Dr. Priestley.

It is not our intention to enter into any analysis of these several departments. But we feel it to be only due to the very able address of Mr. Vernon Harcourt, the real originator of the *permanent* association, to make one or two quotations from it; for we view it as an address differing much from what is too often found upon such occasions, as perfectly free from affectation, as abounding in the soundest views of the present state of science, and written in a manly and highly perspicuous style.

The following passage sets in a true light the bearing of the new association upon already existing societies:—"It is not by counting the great luminaries who may chance to shine in this year, or that,—in a decade of years, or a generation of men,—that we are to inform ourselves of the state of national science. Let us look rather to the numbers engaged, effectually, though less conspicuously, in adding by degrees to our knowledge of nature; let us look to the increase of scientific transactions and journals; let us look, Gentlemen, at the list produced this day of philosophical societies which have grown up in all parts of the kingdom. The multiplication of these new and numerous institutions indicates a wide extension of scientific pursuits. The funds so liberally contributed to their support bear evidence of an enlarged disposition in the public to promote such pursuits.

"It is on this very ground I rest the necessity and the practicability of establishing in science a new impulsive and directive force, that there are new and more abundant materials to be directed and impelled. The mining-field of discovery seems to me to show, on the one part, the ore breaking out on every side; veins of the precious metal scarcely opened or imperfectly wrought; and on the other a multitude of hands ready to work it; but no one engaging them to labour, or showing them in what manner they may employ their industry to the best advantage. And therefore it is that I propose to you to found an Association, including all the scientific strength of Great Britain, which shall employ a short period of every year in pointing out the lines of direction in which the researches of science should move, in indicating the particulars which most immediately demand investigation, in stating problems to be solved and data to be fixed, in assigning to every class of mind a definite task, and suggesting to its members, that there is here a shore of which the soundings should be more accurately taken, and there a line of coast along which a voyage of discovery should be made.

"I am not aware, Gentlemen, that in executing such a plan we should intrude upon the province of any other institution. There is no society at present existing among us, which undertakes to lend any guidance to the individual efforts of its members, and there is none perhaps, which can undertake it. Consider the difference, Gentlemen, between the limited circle of any of our scientific councils, or even the Annual Meetings of our societies, and a meeting at which all the science of these kingdoms should be convened, which should be attended, as this first meeting you see already promises, by deputations from every other society, and in which foreign talent and character should be tempted to mingle with our own. With what a momentum would such an Association urge on its purpose! what activity would it be capable of exciting! how powerfully would it attract and stimulate those minds, which either thirst for reputation or rejoice in the light and sunshine of truth!"

The same views are, perhaps, still more happily presented in the following paragraphs,—which we really hope will go far to do away with the erroneous impression, still existing in some quarters, of an intentional interference on the part of the new institution with other scientific bodies.

"But there is a defect in these separate societies, in respect to their own immediate objects, which I am sure no member of them would wish to dissemble, and which arises from the narrow basis on which they are of necessity built. It is not only, that the constant converse of men, who, to borrow the expression of Goldsmith, have often travelled over each other's minds, is not half so effectual in striking out great and unexpected lights, as the occasional intercourse of those who have studied nature at a distance from each other, under various circumstances, and in different views; but it is also, Gentlemen, that none of our existing societies is able to concentrate the scattered forces even of its own science; they do not know, much less can they connect or employ, that extensive and growing body of humble labourers who are ready, whenever they shall be called upon, to render their assistance."

"What numberless suggestions, what a crowd of valuable but abortive hints are continually floating in the thoughts of philosophers, for the pursuit of which time is wanting to themselves! Now I say, Gentlemen, that we have among us, scattered through the country, men willing to adopt these unexecuted hints, as they arise out of the profound and varied meditations of more experienced minds, men not incapable of surveying with accuracy a limited district, though they may not pretend to draw the general outline of the map, or fill up the whole of its details. Many such there are who only wait for instructions, and who require no other stimulus than that of being invited, to render the most essential service to researches and calculations of the highest order; and it is upon this ground especially that we venture to pronounce an Institution wanting, which shall not hesitate to make such invitations and to offer such instructions; it is upon this ground that if we now propose to revive in the nineteenth century a plan devised two centuries ago,—we see a difference, Gentlemen, in the probability of success. Scientific knowledge has of late years been more largely infused into the education of every class of society, and the time seems to be arrived for taking advantage of the intellectual improvement of the nation. Let Philosophy at length come forth and show herself in public; let her hold her court in different parts of her dominions; and you will see her surrounded by loyal retainers, who will derive new light and zeal from her presence, and contribute to extend her power on every side.

"Much, indeed, is not to be gained in the more recondite subjects of investigation from the first essays of inexpert inquirers; but let the number of those inquirers only be increased, collect around you, Gentlemen, a school fired with a zeal for truth, confess to them how little you know compared with what remains to be known, apprise them that there is not a subject to which they can apply themselves where new materials are not wanted to advance the fabric or secure the foundations, let them see that the more multiplied have been your discoveries, the more additional openings to discovery have appeared,—and if you will then draw the precise line of what is, and what is not made out in every science, if you will indicate to them those promising points and *inlets* of inquiry which bid fair to lead to promising results,—if you will thus put before them right subjects, and at the same time suggest the right methods of treating those subjects; whatever more may be wanting to accurate and successful investigation, natural sagacity and a longer experience will easily supply to men possessing only common abilities, and walking in the common paths of life."

We feel that we should discharge but imperfectly our duty in disseminating as widely as possible the objects of this Report, did we not transfer to our pages the recommendations of the sub-committees of the Association upon different branches of science, who are in fact the active organs of the Association, forwarding its scientific objects, and providing the intellectual occupation of its successive meetings.—*Brewster's Journal.*

IMPROVED METAL HONE.

The exquisite edge given by the cutler to razors, lancets, and other fine-cutting instruments, can rarely be produced by those persons who are in the habit of using them. This arises partly from ignorance of the properties in which consists the difference between a good and a bad hone, and partly from want of that skill and slight of hand in the use of a hone, which long and constant practice only can give in perfection. Mr. Fayrer, of White Lion-street, Pentonville, has proposed, as an improvement, that the hone be made from a plate of brass, about an inch wide, and of any convenient length, ground to a perfectly smooth surface of both sides, one of which is marked R and the other S; part of each end is cut or filed away, leaving only two pins, or pivots, on which the hone turns or swings. In the frame are two uprights, with notches to receive the pivots; there are two boxes, one to hold a coarser and the other a finer powder, made of oil-stone ground down and washed over: for the latter, finely pounded water-of-Air-stone may be conveniently substituted.

To use the hone, first place the side marked R uppermost, and put on it a few drops of oil and a little of the rougher or coarser powder; then draw along it, in the usual manner, the edge of the razor or other tool to be sharpened. As the hone swings on two pivots, the surface necessarily applies itself quite evenly along the edge of the blade, in whatever direction the pressure of the hand is made that holds the tool; and the particles of the powder, as the operation proceeds, are continually becoming smaller and smaller, and therefore giving a finer and finer edge to the tool or blade. To finish the setting, turn uppermost the surface of the hone, marked s, apply to it oil and the finer powder, and proceed as before.

Metal plates, both of steel and of tin, have already been made to serve the purpose of hones; but the application of brass as a material for this purpose seems to be new, as well as the contrivance of hanging it on pivots, in order to accommodate itself to the varying pressure of the hand.

CEMENT FOR UNITING FRAGMENTS OF EARTHEN VESSELS AND OTHER OBJECTS.

ADD to an ounce of mastich, in tears, well rectified spirit of wine, in sufficient quantity to dissolve it. Steep an ounce of isinglass in water until it is very soft; dissolve it in pure rum or brandy till it forms a strong jelly. Then add a quarter of an ounce of gum ammoniac well pulverised. Expose the two mixtures together, in an earthen vessel, to a gentle heat: when they are well commingled, pour the whole into a vial, and keep it well corked. When it is to be used, place the vial in hot water, and warm also the vessels of porcelain or glass which are to be mended. It will be better that the broken surfaces, after having been glued together carefully with this cement, remain pressed into close contact during, at least, twelve hours. The broken places will then remain as firm as the other parts.

Scotch Patents.

PATENTS GRANTED IN SCOTLAND, 1831.

To James Slater, of Salford, in the county of Lancaster, bleacher, for an invention of certain improvements in the method of generating steam or vapour, applicable as a moving power, and to arts and manufactures; and also for improvements in vessels or machinery employed for that purpose.—June 23.

To Matthew Uzielli, of Clifton Street, Finsbury Square, in the county of Middlesex, gentleman, for an invention in consequence of a communication made to him by a certain foreigner residing abroad, for improvements in the preparation of certain metallic substances, and the application thereof to the sheathing of ships, and other purposes.—June 23.

To James Cochrane, of Greenside Lane, in the city of Edinburgh, brass-founder, for an invention of a certain improved method of manufacturing tubes or pipes of lead, block-tin, copper, or other metals.—June 27.

To George William Turner, of the parish of Saint Mary, Bermondsey, in the county of Surrey, paper-manufacturer, for an invention of certain improvements in machinery for making paper.—June 27.

To William Westley Richards, of Birmingham, in the county of Warwick, gun-manufacturer, for an invention of certain improvements in the construction of touch-holes, and primers suitable to percussion guns, pistols, and all sorts of fire-arms fired upon that principle.—June 27.

To Richard Wood, of New York, in the United States of America, but now of Bishopsgate Street Without, in the city of London, being one of the people called Quakers, for an invention of an inking apparatus to be used with certain descriptions of printing-presses.—July 6.

To George Goodlet, residing in Leith, in that part of the United Kingdom of Great Britain and Ireland called Scotland, and proprietor of the London, Leith, and Edinburgh Steam-Mills, for an invention of a new and improved steam-kiln for drying all kinds of grain, beans, peas, malt, and seeds of every description.—July 6.

To William Gutteridge, of the parish of St. John, Clerkenwell, engineer, for an invention of certain improvements in apparatus for distilling, and other purposes.—July 6.

To Henry Lister Maw, of South Molton Street, in the county of Middlesex, Lieutenant in the Navy, for an invention of an improved method of using fuel, so as to burn smoke.—July 22.

To Thomas Spiney, of Cheltenham, in the county of Gloucester, gas-engineer, for an invention of certain improvements in apparatus for manufacturing gas for illumination.—July 27.

To George Givinett Bompas, of Fishponds, near Bristol, Esq. M. D., for an invention of an improved method of preserving copper and other metals from corrosion or ozydation.—Aug. 18.

To Isaac Higgins, of London Street, in the city of London, merchant, for an invention in consequence of a communication made to him by a certain foreigner residing abroad, of certain improvements in extracting sugar or syrup from cane-juice and other substances containing sugar and in refining sugar syrups.—Aug. 18.

To Benjamin Ainsworth, in the parish of Birmingham, in the county of Warwick, button-maker, for an invention of an improvement in the making and constructing of buttons.—Aug. 23.

To Jas. Down, of Leicester, in the county of Leicester, surgeon and apothecary, for an invention of certain improvements in making gas for illumination; and in the apparatus for the same.—Sept. 21st.

To Thomas Brunton, of Park-square, Regent's-park, in the county of Middlesex, Esq. for an invention communicated to him by a certain foreigner residing abroad, of an improvement in certain apparatus, rendering the same applicable for distilling, brewing, making or refining sugar, and to other useful purposes.

To James Lang, of Greenock, Scotland, North Britain, flax-dresser, for an invention of certain improvements in machinery, for spreading, drawing, roving, or spinning flax-hemp, or other fibrous substances, dressed or undressed.—Oct. 5.

To Jean Jacques Jequier, of Castle-street, Leicester-square, in the county of Middlesex, merchant, for an invention, in consequence of a communication made to him by a certain foreigner residing abroad, of certain improvements in the machinery for, or method of making paper, which he denominates the Xeranothlipte.—Oct. 5.

To George Forrester, of Vauxhall Foundry, Liverpool, in the county of Lancaster, civil engineer, for an invention of certain improvements in wheels for carriages and machinery, which improvements are applicable to other purposes.—Oct. 12.

To John Milne, of Shaw, in the parish of Oldham, in the county of Lancaster, cotton-spinner, for an invention of improvements in certain instruments or machines commonly called roving frames and slubbing frames, used for preparing cotton wool for spinning.—Oct. 24.

To George Lowe, of Brick-lane, in the parish of St. Luke, Old-street, in the county of Middlesex, civil engineer, for an invention of an improvement or improvements in, and connected with the manufacture of gas for illumination.—Oct. 31.

To Daniel Dunscomb, Bradford, a citizen of the United States of North America, but now residing in Dorset-place, in the parish of St. Mary-le-bone, in the county of Middlesex, for an invention, in consequence of a communication made to him by Solomon Andrews, residing at Amboy, New Jersey, in the said United States of North America, of certain improvements in lamps.—Nov. 14.

To Samuel Brown, of Billeter-square, in the city of London, commander in the Royal Navy, for an invention of certain improvements in the means of drawing up ships and other vessels from the water, on land, and for transporting or moving ships or vessels and other bodies, from one place to another.—Nov. 22.

To William Alltost Summers, of St. George's-place, St. George's in the East, in the county of Middlesex, engineer, and Nathaniel Ogle, of Milbrook, in the county of Hants, Esq. for an invention of certain improvements in the construction of steam-engine and other boilers or generators applicable to propelling vessels, locomotive carriages, and other purposes.—Nov. 26.

To William Furnival, of Wharton, in the county of Chester, Esq. for an invention of certain improvements in evaporating brine.—Dec. 1.

To Jacob Perkins, of Fleet-street, in the city of London, engineer, for an invention of certain improvements in generating steam, and evaporating and boiling fluids for certain purposes.—Dec. 10.

To Thomas Sands, of Liverpool, merchant, for an invention, in consequence of a communication made to him by a certain foreigner residing abroad, of certain improvements in machinery for spinning, twisting, and roving.—Dec. 15.

New Patents

GRANTED IN ENGLAND IN 1832.

To Thomas Gaunt, of Chapman Street, Islington, in the county of Middlesex, gentleman, for his having invented or found out a certain improvement or improvements in gaiters or spatter dashes. —Sealed 27th March, 6 months for Inrolment.

To Joshua Taylor Beale, of Church Street, Whitechapel, in the county of Middlesex, engineer, for his having invented or found out certain improvements in steam engines.—28th March, 6 months.

To John Howard Kyan, of South Row, Euston Square, in the county of Middlesex, esq. for his having invented a new mode of preserving certain vegetable substances from decay.—31st March, 6 months.

To John Bate, of the Poultry, in the city of London, optician, for his having invented an improvement or improvements on machinery, applicable to the imitation of medals, sculpture, and other works of art, executed in relief.—9th April, 6 months.

To Alexander Beattie Shankland, of Liverpool Street, in the city of London, in consequence of a communication made to him by a foreigner residing abroad, for a new method of spinning flax and hemp by means of machinery.—13th April, 6 months.

To John Demeur, of Water Lane, Tower Street, in the city of London, gentleman, for his having invented and found out a manufacture in the extraction of oleagenous matter, from a certain foreign vegetable kernel, and the application of the said oleagenous matter to the making of oil, candles, soap, and other articles of commerce, a part of which invention has been communicated to him by a foreigner residing abroad.—13th April, 12 months.

To John James Clark, of Market Raven, in the county of Lincoln, gentleman, John Nash, of the same place, tile and brick manufacturer, and John Longbottom, of Leeds, in the county of York, machine maker, for their having invented certain improvements in the machinery and process used in the manufacture of tiles, bricks, bread, biscuits, and other articles formed of plastic materials, a part of which improvements is applicable to other purposes.—13th April, 6 months.

To Benjamin Cook, of Birmingham, in the county of Warwick, brass founder, for his having invented an improved method of manufacturing various useful articles from a metal not hitherto used for that purpose.—13th April, 6 months.

To Richard Roberts, of Manchester, in the county of Lancaster, civil engineer, for his having invented or found out a certain improvement or certain improvements in steam engines, and also in the mechanism through which the elastic force of steam is made to give impulse, and to regulate the speed of locomotive carriages.—13th April, 6 months.

To John George Edwards, of St. Mary's Square, Birmingham, in the county of Warwick, gentleman, for his having invented a philosophic alphabet, arrangement of letters, forms, or figures, by which the articulate sounds of languages may be scientifically denoted.—13th April, 6 months.

NEWTON AND BERRY,
Office for Patents.

Chancery Lane, London.

CELESTIAL PHENOMENA, for May, 1832.

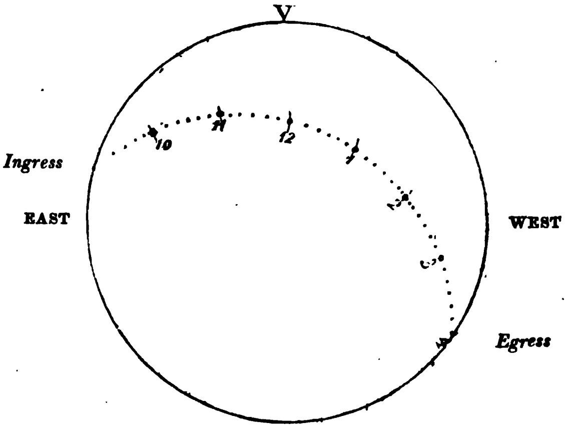
D.	H.	M.	
1	0	0	Clock after the ☉ 3 m. 4 s.
1	0	0	☉ rises 4 h. 36 m. sets 7 h. 24 m.
1	20	48	♃ passes the meridian.
1	22	34	♀ passes the meridian.
2	22	0	☽ in perige.
4	0	0	Ceres R. A. 1 h. 1 m. Decl. 2. 13. S.
4	8	50	☽ passes the meridian.
5	0	0	Clock after the ☉ 3 m. 29 s.
5	0	0	☉ rises 4 h. 29 m. sets 7 h. 31. m.
5	0	0	☿ Transit ☉
6	20	5	☽ in □ or first quarter.
7	7	44	♄ passes the meridian.
7	20	29	♃ passes the meridian.
7	22	39	♀ passes the meridian.
8	0	0	Ceres R. A. 1 h. 7 m. Decl. 1. 41. S.
8	0	0	Vesta R. A. 8 h. 49 m. Decl. 23. 37. N.
8	0	0	Occultation of Saturn Im. 9 h. 7 m. Em. 10 h. 7 m.
9	8	26	☽ passes the meridian.
10	0	0	Clock after the ☉ 3 m. 49 s.
10	0	0	☉ rises 4 h. 21 m. sets 7 h. 39 m.
13	23	25	☿ passes the meridian.
11	9	59	☽ passes the meridian.
13	20	10	♃ passes the meridian.
13	22	43	♀ passes the meridian.
14	5	24	Ecliptic oppos. or ○ full m.
15	0	0	☉ rises 4 h. 14 min. sets 7 h. 46 min.
15	0	0	☿ in Aphelio.
15	0	18	☾ passes the meridian.
16	0	0	Juno R. A. 10 h. 6 m. Decl. 11. 35. N.
16	22	57	☿ passes the meridian.
16	0	0	Pallas R. A. 23 h. 26 m. Decl. 5. 39. N.
18	0	0	☾ in Apogee.
19	0	0	☿ in conj. with ♀ long. 9. 40. in Taurus, ☿ lat. 3. 11. S. ♀ lat. 1. 21 S. diff. of lat. 1. 50.
19	22	47	♀ passes the meridian.
20	0	0	Clock after the ☉ 3 m. 45 s.
20	0	0	☉ rises 4 h. 7 m. sets 7 h. 53 m.
20	0	0	Ceres R. A. 1 h. 23 m. Decl. 8. S.
20	14	54	☉ enters Gemini.
22	9	20	☾ in □ or last quarter
23	6	37	☾ passes the meridian
24	1	52	☾ in conj. with ♂ long. 22 in Pisces, ☾ lat. 3. 41. S. ♂ lat. 1 54. S. diff. of lat. 1. 47.
24	4	30	☾ in conj. with ♃ long. 24 in Pisces, ☾ lat. 3. 48. S. Jup. lat. 1. 2. S. diff. of lat. 2. 40.
24	0	0	Vesta R. A. 9 h. 11 m. Decl. 22. 2. N.
24	0	0	Juno R. A. 10 h. 13 m Decl. 11. 21. N.
25	0	0	☉ rises 4 h. sets 8 h.
25	6	34	♄ passes the meridian.
25	19	29	Jup. passes the meridian.
25	22	0	♂ in conj. with Jup. long 24 in Pisces, ♂ lat. 1. 54. S. Jup. lat. 1. 8. S. diff of lat. 46.
25	22	58	♀ passes the meridian.
27	18	45	☾ in conj. with ☿ long. 13 in Taurus, ☾ lat. 5. 5. S. ☿ lat. 3. 40. S. diff. of lat. 1. 25.
28	7	51	☾ in conj. with ♀ long. 20 in Taurus, ☾ lat. 4. 59. S. ♀ lat. 1. 12. S. diff. of lat. 3. 47.
29	11	56	Ecliptic conj. or ● new moon
30	0	0	Clock after the ☉ 2 m. 48 s.
30	0	0	☉ rises 3 h. 54 m. sets 8h.

J. LEWTHWAITE Rotherhithe

It may be worthy of remark, on the 8th of the month, that the major and minor axes of Saturn's ring will then be nearly as 10 to 1.

TRANSIT OF MERCURY.

NEARLY thirty years have elapsed since a phenomenon of this kind was visible in England. On Saturday, the 5th of May, Mercury may be seen as a black spot upon the Sun's disc for nearly seven hours, if the weather be favourable. So long a transit in duration will not occur until the year 1845, and another in 1878.



In the above figure, the circle is designed to represent the Sun's disc. of which v, is its vertex ; and the dotted curve, to shew the path of Mercury over the Sun, with the clock time marked.

At Greenwich, the transit will begin at 67° 35' from v, on the Eastern border of the Sun's disc ; and it will end at 126° 18' from v, on the Western border.

	Appl. time.	Clock time.
External ingress or beg: of the transit	9 2 57	8 59 28
Internal ingress....................	9 6 27	9 2 48
Time of ☿'s nearest approach........	0 28 50	0 25 20
Internal egress....................	3 51 11	3 47 41
External egress or end of the transit ..	3 54 31	3 51 1

Entire duration 6 h. 51 m. 34 sec. Sun's semidia: 15' 52". Mercury's semidia 5".7.

METEROLOGICAL JOURNAL

For March and April, 1832.

1832.	Thermo.		Barometer.		Rain in inches.	1832.	Thermo.		Baro meter.		Rain in inches
	Hig.	Low	Hig.	Low			Hig.	Low	Hig.	Low.	
MARCH 26	49	30	30,12	30,01		APRIL 11	54	31	30,12	Stat.	
27	54	33	29,99	29,91		12	52	33	29,95	29,91	,05
28	50	31	30,03	29,97		13	58	36	29,98	29,82	
29	54	23	29,95	29,90		14	59	32	30,09	29,98	
30	54	29	29,93	29,88		15	61	39	30,05	30,01	
31	53	35	29,82	29,73		16	61	39	29,98	Stat.	,15
APRIL						17	60	31	30,00	29,93	
1	51	36	29,89	29,74		18	58	34	29,79	29,49	,025
2	59	28	30,15	30,06		19	54	41	29,81	29,56	,025
3	63	29	30,41	30,34		20	54	38	29,69	29,63	,05
4	68	29	30,50	30,44		21	57	35	30,11	30,01	,075
5	67	33	30,41	Stat.		22	58	31	30,09	30,00	
6	57	34	30,33	30,30		23	63	36	29,81	29,68	
7	51	30	30,19	30,10		24	53	35	29,75	29,68	
8	54	33	30,11	30,10		25	49	37	29,80	29,75	,025
9	57	30	30,16	30,11							
10	57	34	30,18	30,12							

Edmonton.

Charles Henry Adams.

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PATENT INVENTIONS.

No. II.

(CONJOINED SERIES.)

Recent Patents.

To Malcom Muir, *of Hutchinson Town, Glasgow, in that part of the United Kingdom of Great Britain called Scotland, engineer, for his invention of certain improvements in machinery or apparatus for preparing boards for flooring and other purposes.*—[Sealed 22d December, 1831.]

This invention is an improvement upon a machine for which a former patent was granted to the said Malcom Muir, 1st June, 1827, and of which a description was given in the *London Journal of Arts,* Vol. II. Second Series, page 68. We then stated our inability to furnish a complete representation of the machine, but being now enabled to supply that defect, avail ourselves of the present opportunity to lay before our readers a more perfect description of that ingenious and highly useful invention, which, with its latter improvements, is in effective operation at the Saw Mills, Pimlico, near London.

The machine which formed the subject of the former patent, is shewn in isometrical perspective in Plate III, at fig. 1; it consists of a perfectly flat and strait horizontal bench *a, a, a,* which is made fast to blocks of stone, or to substantial framing, in order to keep the whole steady. On one side of this bench there is a raised fence *b, b,* for the purpose of forming a guide to the board *c, c,* intended to be passed along the bench to be rendered smooth on its face, by means of the planing irons *d, d, d,* which are nearly of the usual form, their cutting edges standing up and adjustable by screws, by which the shavings are taken from under the surface of the board as it passes over them. The board is drawn forward, that is, slidden along the bench by means of hooks or catches *e,* pendent from the endless chain *f, f,* and this chain is made to travel by the spur wheel *g,* which is actuated by toothed gear from the axle of the driving drum *h.*

The board, as it advances, is kept down upon the planing irons by pressure rollers *i, i, i, i,* mounted within a frame at *k, k*; strong springs *l,* or levers being made to press upon the axles of the rollers, so as to prevent the board from rising as it moves onward.

When it is required to tongue and feather the edges of the board, lateral circular saws are placed as at *m, m,* turning horizontally, and the edges of the board are cut square and parallel by vertical saws *n, n,* all of which are actuated by bands from a rotary drum above.

This machine is adapted for simple planing of every description; and if square jointed boards are required, the lateral circular saws employed for tonguing and grooving are to be removed, and such saws introduced in their places as may be requisite, for breadthing or bringing the boards to an equal width and parallelism.

In the machine above described, the face and edges of the flooring board are made smooth, but the back part of the board still remained to be reduced to an even surface or uniform thickness. The subject of the present Patent is the construction and adaptation to the above machine, of an apparatus for rendering the backs of the boards even, and consists of a rotary cutter for the purpose of removing all the superfluous wood from the back of the board, at the same time that its face and edges are under the operation of the flooring machine.

Fig. 2, is a side view or elevation of the improved part of the flooring machine. Fig. 3, is a section of the same, taken in the dotted line A, B, in fig. 4, which is a horizontal view or plan of the improved apparatus: the several letters of reference pointing out the corresponding parts of the machinery in the three last figures.

The flooring machine to which the new rotary cutters are adapted, is likewise partially represented in these figures, viz. the pitched and toothed wheels, part of the endless chain *f*, and of the plate of metal that forms the bench *a*, which the board *c*, moves upon; and that the plane irons *i*, fixed into these parts, are fully described in the aforesaid specification, but are here exhibited, to shew their relative position and connexion with the new part.

The board *c*, *c*, being made to move along the bench *a*, *a*, by the means above described, is brought under the operation of the rotary cutters *z*, *z*; these rotary cutters are designed for the purpose of reducing the back of the board to a parallel thickness with its face, and consist of adze or broad chisel edged steel bars, mounted on arms projecting from an axle *y*, which turn in bushes on the standard or frame *x, x,* secured to the plate of metal or bench *a, a,* by any suitable means; its rotary action being communicated by a band *w, w,* from the large drum of the machine, passed round a pulley or rigger *v,* fixed upon the end of the axle of the cutter.

The chisel or adze blades are to be adjusted and fixed upon the arms by means of screws, so as to enable them to cut to any desired depth; and rotary motion being by the above means given to the cutters as the board passes under them, the superfluous thickness on the back of the board is taken off by a rapid succession of strokes of the cutters, and it is thereby reduced to a parallelism with the face of the board previously rendered smooth by the planing irons as described.

In order to prevent the board from rising during the operation, it is kept down by rollers *u, u,* mounted upon two axles, the ends of which axles are introduced into grooves formed in the sides of the standard frames *x, x,* and are pressed upon the back of the boards by the bow or spanner *t, t,* and the weighted lever *s.*

The progress of the board upon the bench is effected by hooks or catches *e,* in the links of the endless chain *f, f,* which take hold of the end of the board, and bring it forward as the chain travels. It will therefore be perceived, that when the end of the board has arrived under the axle of the chain wheel, the hook *e,* will leave it. The motion of the board must therefore be continued, by placing another similar board at the end of the former, and by dragging it forward by another catch upon the chain to be operated upon, as above, and thereby propel the first board through the machine, and thus by the following board continue the operation.

The Patentee states, in conclusion, that he does not intend to confine himself to the employment of any precise number of cutters to be attached to the rotary axle, as their numbers will be regulated by the quality and condition of the wood to be operated upon, and the speed with which they are made to turn. Neither does he intend to confine himself to the precise situation of the rotary cutters shewn in the drawings, as respects the other parts of the machinery, for it may be found convenient to employ more than one set of rotary cutters in one machine. And he intends, in the event of preparing rough planks and boards, to employ similar rotary cutters, both upon their under and upper surfaces. By this adaptation of the rotary cutter, he is enabled to finish the flooring boards at once in his machine, and thereby dispense with the hand labour of adzing, which formerly was necessary after planing, in order to bring the boards nearly to an equal uniform thickness or parallelism.—[*Inrolled in the Roll's Chapel Office, May,* 1832.]

Specification drawn by Messrs. Newton & Berry.

To DAVID SELDEN, *of Liverpool, in the county palatine of Lancaster, merchant, in consequence of a communication made to him by a foreigner residing abroad, for an invention of certain improvements in metallic mills for grinding coffee, corn, drugs, paints, and various other materials.*—[Sealed 11th August, 1831.]

THESE improvements in metallic mills, consist in combining the following parts and pieces:—

First, provide a piece of iron, represented in Plate IV. fig. 1, which piece of iron is intended to constitute the back of the mill, and has a circular part *a, a, a,* with a smooth surface. From the side of this circular part, an ear *b, b,* extends, with holes through it, for the purpose of screwing, or otherwise securing it to a post or part of the building where the mill is to be used. A dovetail formed piece *c, c,* extends from the top of the circle which is to constitute one side of the hopper, and below is a small recess *d,* to form the back part of the shute. The thickness of this plate, and its sectional form, are represented at fig. 2, which is a transverse section of the complete mill, when all its parts are put together. In the centre of the circular plate, there is a square cavity *e,* intended to hold a washer, or piece of metal, to act against the end of the central axle of the runner.

Fig. 3, represents the runner *f, f,* which is formed nearly as the segment of a sphere, or of an extremely obtuse cone, with the teeth or indentations on its surface, having a shaft or angle *g,* extending from its centre, as shewn in fig. 2. The circular edge of this runner at the back part, bears against the plate *a, a, a,* and the back end of the axle against the washer, before mentioned, in the recess *d,* the front end of the axle being elongated, for the purpose of having a crank handle or rigger attached to it, by which the mill might be driven. Fig. 4, represents the plate with the runner placed against it, and fig. 5, is an inside view of the cap *h, h, h,* which answers to the bed of the mill. The internal part of this cap is formed conically, but not quite so obtuse as the surface of the runner, in order that a wider space may be left toward the apex of the cone, for the articles in grinding to be first broken, and then gradually reduced to fine powder as they approach the outer edges of the cones.

The surfaces of the runner *f*, and also of the cap *h*, are cut into teeth or indentations in oblique directions, commencing from the axle and extending to the edge. Five or more diagonal teeth *i, i, i, i, i,* according to the size of the mill, are cut deep, near the centre, in order to receive the articles to be ground, and diminishing toward the edges to the fine score.

These teeth are placed with their sharp angles toward the work, in order to carry out the material grinding toward the edge, as in ordinary mill stones.

The angular spaces between these large teeth toward the outer parts of the cone, are cut in the same manner as shewn at *k, k, k,* into angular teeth, and on the periphery of the runner, there are projecting pieces at small distances apart, as clearers, to carry round the material, when ground, to the delivery spout. The runner placed upon the plate, as shewn at fig. 4, is kept in its proper situation by the cap which is fixed over it, as seen in the section, fig. 2, and also the external view of the mill; fig. 6, the axle passing through the aperture in the centre. The cap is then made fast to the plate by screws or rivets passed through the ears or pieces at *u* ; a piece at bottom of the cap completing the form of the delivery spout *m,* and the piece *n*, which constitutes the other part of the hopper, is attached by screws or rivets in like manner.

The runner being thus mounted, is turned upon its axle by the crank, and moves freely round within the cap ; the space between the two being regulated by the screw *o*, at the back of the washer, and thus the mill is suited to grind to any degree of fineness that may be desired.

The material to be ground is now introduced into the hopper, from whence it descends through the aperture *p*, in the cap between the two conical surfaces, and becomes broken or pulverized as the runner revolves, it having been received into the mill near the apex of the cones, where the teeth are coarse and deep, for the purpose of being first broken, and it is ultimately driven out toward the edges of the cones, where the teeth become gradually finer, by which it becomes sufficiently reduced or pulverized before it is delivered by the clearers to the spout.

The Patentee says, in conclusion, that which I claim as new, is the above construction of the cones, and the manner of commencing the grinding at the centre of the mill where the teeth are coarse, and finishing at the periphery where they are finer, upon the same principle as the ordinary corn mill stones. And the making of all the principal parts of cast iron, or of wrought iron, or of stamped plate iron, if that should be found practicable, and the peculiar arrangement of the parts, and the manner of cutting the teeth to points described before.

The hopper, described as cast in two parts, may, if necessary, be made whole, which will reduce the number of pieces, and render the ears upon them and the rivets unnecessary. These mills may be made of any size, for all purposes to which they may be applicable, and placed in frames, or screwed to any secure rest; and when any article is to be reduced to an impalpable powder, or if paint or drugs are to be ground in oil or water, the edge of the cones, from one quarter to half an inch inwards, may be left plain, to rub against each other, serving the same purpose as the common paint stone and muller.—[*Inrolled at the Rolls Chapel Office, Feb.* 1832.]

Specification drawn by Messrs. Newton and Berry.

To Daniel Papps, *of Stanley End, in the parish of King's Stanley, in the county of Gloucester, machine maker, for his having invented certain improvements in machinery for dressing or roughing woollen cloths.* [Sealed 23d December, 1830.]

The machinery which forms the subject of this Patent may be considered as an addition to a gig mill employed for raising the pile on woollen cloth, that is, drawing out the fibres of the wool which are to constitute the nap or face of the cloth when finished. By the ordinary operation of the gig mill, the pile is raised, that is, the fibres are drawn out in the direction of the length of the cloth only, for as the gig barrel or drum (on the periphery of which the teasles are set) revolves in one direction, the cloth travels over it in an opposite direction, and, consequently, the points of the teasles take hold of those fibres of the wool only which lay exposed as it passes longitudinally.

The object of the present invention is to work a system of teasles crosswise of the cloth, in order to draw out the pile upon the face of the cloth in transverse directions, in addition to those fibres which are raised longitudinally by the rotary gig barrel as above described.

Plate III. fig. 5, is an elevation of the side of a machine, in which the improved apparatus proposed by the Patentee is shewn in connection with an ordinary gig barrel; *a, a, a,* is one of the side standards or frames of iron which supports the whole apparatus; *b,* is the gig barrel, mounted in the frame, and driven round by a band and rigger affixed to its axle; *c, c, c, c,* represents the cloth intended to be operated upon, the ends of which are tacked together, allowing it to pass through the machine in an endless web over the tension rollers *j*, *m*, *l*.

As the gig barrel revolves, a pinion on the end of its axle at *d*, drives the longitudinal shaft *e*, which is connected by an universal joint to the oblique shaft *f*, and a pinion at the end of this shaft *f*, takes into the wheel *g*, affixed to the end of a roller *h*, by which the cloth is drawn forward through the machine, and let fall upon the creeper *i*, *i*, below.

The teeth of the wheel *g*, take into a pinion on the top of the perpendicular shaft *k*, and, consequently, as it revolves, communicates a rotary movement to that shaft, which by means of an endless screw at its lower extremity, drives the carrier roller *l*, and causes the creeper *i*, *i*, to conduct the cloth *c*, *c*, *c*, toward the front part of the machine, there to be taken up at *m*, in order to be acted upon by the gig barrel.

By the description of the machinery thus far given, it will be seen that the endless web of cloth passes in the direction of the arrow, and that the gig barrel, as shewn by its arrow, revolves in an opposite direction; hence, by these means, the pile or nap is only drawn out longitudinally or lengthwise of the cloth. We now proceed therefore to describe the other machinery, by which the pile is raised transversely, or as the Patentee expresses it, " from the middle toward the lists."

The cloth, after passing under the gig barrel, in its progress from the roller *j*, to *l*, is intended to be acted upon by hands or frames of teasles *n*, *n*, which are made to traverse across the cloth by the means about to be described. In fig. 5, the new apparatus is seen endwise; but in fig. 6, which is a horizontal view of that part of the machine, its construction and manner of acting will be more perfectly perceived.

Four perpendicular spindles *o, o, o, o,* are mounted in plummer blocks on each side of the elevated part of the frame *a, a,* and upon each of these spindles an upright cylinder or drum is fixed. These drums are connected together in pairs by endless chains *p, p, p, p,* which carry the teasle frames, shewn more clearly in the detached fig. 7.

The endless chains *p, p,* are formed by pieces of wood linked together by joints, which enable them to lap round the cylinders. To these pieces of wood the rods are attached that hold the hands or frames of teasles *n, n.* A pulley or horizontal rigger *q,* fixed upon a perpendicular shaft *r,* which is driven by a pinion from the longitudinal shaft *e,* above described, gives motion to the endless chains and cylinders by bands from the rigger *q,* carried round pulleys *s, s, s, s,* mounted upon the spindles *o, o.*

A bed at *t,* over which the cloth passes, is pressed up against the teasles by levers *u,* and *v,* and the surface of this bed is covered by a brush of perpendicular bristles, in order to give elasticity to the cloth as the teasles traverse across it.

The machinery being put in motion by the means described, as the cloth passes over the bed *t,* the hands or frames of teasles *n, n, n, n,* traverse upon the face of the cloth in the directions shewn by the arrows in fig. 6, that is, from the middle toward the lists, which traversing of the teasles, causes other fibres or ends of the wool to be drawn out crosswise, in addition to those raised longitudinally by the gig barrel, by which means a more complete raising of the pile is effected, and a more perfect nap produced than by the operation of the gig barrel alone.

The Patentee does not claim the precise form or construction of machinery for raising the pile, or as he terms it, roughing woollen cloths, but he claims the working of teasles, wires, brushes, or other suitable substances, on the face of woollen cloths crosswise, that is, from the middle toward the lists by the endless chains conducted by rotary spindles as described.—[*Inrolled in the Inrolment Office, February,* 1831.]

In comparing this invention with the machine for raising the pile on woollen cloth, described in Mr. Oldland's Specification (see Page 21, of our present Vol.), the similarity is very apparent, not only of the intended effect upon the cloth, but also of the mechanical contrivance by which it is to be accomplished. Can it be supposed that traversing the frames with the teasles over the cloth transversely, by means of two driving spindles instead of one, is a legitimate invention? We should consider it a mere evasive imitation, and if carried into operation, a palpable infringement of Mr. Oldland's previous invention and patent right.

To WILLIAM NEEDHAM, *of Longnor, in the county of Stafford, gentleman, for his having invented certain improvements in machinery for spinning, doubling and twisting silk, and other fibrous substances.*—[Sealed 13th December, 1830.]

THE Patentee commences his specification by saying, that his invention consists in the construction of a machine, by which spinning, doubling, and twisting may be carried on at the same time, and then proceeds to describe the drawing appended to the specification in words to the following effect:—

Plate III, fig. 8, is a front elevation of the machine;

a, b, are two bobbins of raw silk; *c, d,* are two wire guides, or eyes, fastened into sliding pieces of wood *e,* and *f,* which have adjustable screws at the back, for the purpose of moving the guides higher or lower, in order that the thread may, as occasion shall require, form a greater or less angle over the edge of the bobbin, and by that means produce a greater or less resistance to the unwinding of the silk from the bobbin.

From the guides *c, d,* the silken threads ascend and pass over the angular piece or saddle *g,* at the top of which they meet, and are there twisted into that condition of silk thread called organzine, by means of the twisting apparatus *h,* at top, where the two threads so twisted are also wound upon the bobbin *i.*

Fig. 9, represents the twisting apparatus upon an enlarged scale; *j,* is a perpendicular spindle, fixed by screwing into the top rail; at the bottom of this spindle there is an endless screw or worm *k,* surrounded by an oil chamber or box, into which oil is poured at the aperture *l,* when it is required to be replenished; *m,* is a horizontal shaft, having a pinion at each end *n,* and *o.* The pinion *n,* works round the endless screw *k,* and the shaft is by that means made to revolve, which causes the pinion *o,* to give rotary motion to the twist bobbin *i,* through the medium of the wheels *p,* and *q.* At the other end of the twist bobbin *i,* there is a pinion *t,* taking into a wheel *v,* which, by communicating with the horizontal crown wheel *s,* gives motion to a crank guide wire that lays the thread evenly on the twist bobbin. This crank guide wire is more perfectly seen in the horizontal representation at fig. 10.

The parts of the twist bobbin described, are mounted in a frame *x, x, x,* on the top of which is fixed a tube, that carries a pulley *w.* Motion being given to this pulley by a cord or band, as shewn in the transverse section of the machine, at fig. 11, the frame *x*, and all the parts mounted within it, are carried round; and the pinion *n*, working in the endless screw, by that means turns the bobbin upon it axis, and causes it to take up or wind on the thread. A small piece of leather, or other suitable material, should be placed round the shaft *m*, as a packing, to prevent the oil from passing too freely.

In the section fig. 11, the driving pulleys are shewn 1, is the main driver; 2, drives the vertical bobbins *a*, *b*, at the lower part of the machine; 3, is the pulley that drives the twisting apparatus at top.

The manner in which the machinery is thrown out of gear and stopped when a thread breaks, will be seen by reference to figs. 9, and 11; *r*, *r*, is a balance lever, turning upon a fulcrum on the side rail, the heaviest end of which lever is at the back part over the pulley 1. A horizontal wire *u*, when in its place, keeps this lever *r*, in the situation shewn in fig. 11, in which situation it will remain as long as the two threads from the bobbins *a*, and *b*, pass together through an eye at the end of this wire, and also over the saddle *g*, fig. 9, in the angular directions shewn; but on one of the threads breaking, the other or whole thread will immediately assume a perpendicular direction, and in so doing will draw the wire *u*, toward one side; the balance lever *r*, will then rise into the position shewn by dots in fig. 11, and the reverse or weighted end fall. A spring catch on the side of the driving pulley will now strike against a stud at the weighted end of the lever, and by so doing will cause a pin to be withdrawn, which instantly releases the pulley 1, from the driving shaft, and consequently, the machine stops.

The connection of this pulley with the driving shaft, is by the following means: an iron wheel with arms is fixed upon the shaft, and the spring catch above mentioned, attached to the pulley when in gear, takes hold of one of the arms of the wheel; but when the spring catch is withdrawn by the removal of the pin as above mentioned, the wheel and the pulley are no longer held together, and the shaft may continue going round, but the machinery will all remain stationary.

The Patentee claims as his invention "the twist gear hereinbefore described, and the contrivance for throwing the machine out of gear if either of the threads from the bobbin break."—*Inrolled in the Inrolment Office, June,* 1831.]

To GEORGE FORRESTER, *of Vauxhall Foundry, Liverpool, in the county of Lancaster, civil engineer, for his invention of certain improvements in wheels for carriages and machinery, which improvements are applicable to other purposes.*—[Sealed 5th September, 1831.]

THE invention specified under the above Patent, consists in a peculiar method of combining cast iron with wrought or malleable iron, in the construction of wheels of all descriptions for carriages or machinery, where the invention may be found practicable; and in the application of the same principle of construction to the framing for steam engines and other machinery, the arches of bridges, and in any other case in which cast iron framing may be employed, or where strength and lightness are desirable.

The method of accomplishing this combination is as follows:—A light or skeleton frame, of wrought iron or steel, is formed to the same shape, but of less dimensions than the article required; this skeleton frame is made bright, and free from oxide, by being cleaned in any convenient manner, as grinding, scouring, or filing, so as to adapt it to receive a coating of lead or bismuth, or of tin or zinc, or any mixture of those metals, such coating being given to it by similar means to that used in the process of tinning metals. The article to be cast having been moulded from the pattern, in sand or loam, in the usual way, the skeleton frame, as above stated, is carefully laid in the middle of the respective parts of the mould, projecting pieces being attached to the skeleton frame to keep it in its proper place; the mould is then to be closed, and the cavities formed by the pattern are to be filled up with fluid iron, as in common casting, when the operation is completed.

By this mode of embodying or enveloping wrought iron or steel skeleton frames, of the shape of the intended article, with cast iron, the latter is not injured in its tenacity, while the former is considerably improved in its strength, and the important qualities of toughness or infragibility are introduced into forms more perfect, and structures more solid than can be obtained in wrought or cast iron alone. To prevent any person from misunderstanding this invention, the Patentee has annexed drawings of the method of manufacturing wheels by this process, which will sufficiently explain the nature of the invention, and one of his leading objects, viz. that of constructing wheels for railway carriages.

Plate IV, fig. 7, is a side view of a wrought iron or skeleton framing *a, a*, for a carriage wheel, having a number of holes made throughout its circumference through the ring or tire, for the purpose of allowing the fluid iron in casting to flow through the holes, and fix itself solidly all around the skeleton wheel. Fig. 8, represents a section of the carriage wheel taken in the line of its motion, shewing the skeleton frame *a*, embodied within the cast iron *b*, *b*; fig. 9, is a section of the wheel taken through its diameter, shewing two of its spokes.—[*Inrolled in the Inrolment Office*, March, 1832.]

To GEORGE STEPHENSON, *of Liverpool, civil engineer, for his having invented improvements in the mode of constructing wheels for railway carriages.*—[Sealed 30th April, 1831.]

THE improved mode of constructing wheels for railway carriages, as described by Mr. Stephenson in his specification, consists in forming the spokes of iron wheels, of hollow tubes of thin wrought iron, and the ring or periphery, and nave or box of cast iron. The tubes or spokes, after being prepared at their ends, as hereinafter described, with borax to serve as a flux, are laid in their proper places within the cavities of the mould of sand, or loam, as formed by the pattern of the wheel, and on fluid iron being poured into the inner cavity of the mould, it will surround and attach itself to the inner ends of all the wrought iron tubular spokes, at the parts where the preparation of borax has been applied, and form a nave or centre piece of cast iron. Melted iron is also to be poured into the outer cavities of the mould, which will surround and attach itself to the outer ends of the spokes, at the parts prepared with borax; and form the circular rim or felly of the wheel, which is afterwards to be surrounded with a wrought iron tire or hoop applied to it when hot, so that it may shrink or contract in cooling, in order to firmly unite and bind itself on to the wheel, after which the outer edge of the wrought iron tire must be turned, to run properly on the railway.

Mr. Stephenson states, that wheels for railway carriages have been made, as described under a patent granted to himself and William Losh, in 1816; the spokes of the wheels, as there specified, were of wrought iron, of various forms (but not hollow tubes), with cast iron naves, and rims formed and united to the ends of the spokes, by running melted iron into the moulds, the cast iron surrounding and attaching itself to the ends of the wrought iron arms, but without any previous preparation of their ends with borax to serve as a flux; and also that wheels so formed have of late been hooped with wrought iron tires.

The Patentee states, that he confines his claims of invention under the present Patent, to the substitution of hollow tubes of wrought iron for spokes, instead of solid bars of wrought iron heretofore used, and to the application of a preparation of borax as a flux, to the ends of the hollow tubular spokes, previous to placing them in the mould, or pouring the fluid iron round them. These tubular spokes are stronger in proportion to their weight than solid bars, and will hold more securely in the cast iron nave and rim, because the cast iron is allowed to run within the ends of the tubes, as well as around the outsides of the ends, and thus obtains a much greater surface of contact with the wrought iron, than is obtained where solid arms are used; and also from the ends of each tube being an extended surface of thin metal, it becomes very highly heated by the fluid iron when it is poured into the mould; and in consequence of the borax applied, both inside and outside of the ends, the heat of the fluid iron causes it to unite and firmly adhere to the wrought iron, whereby strong wheels will be formed for railway carriages, which are very desirable, where passengers and goods are to be conveyed, with the great rapidity of motion which is practised in travelling on the Liverpool and Manchester railway, for the violence to which the wheels are subjected in such quick travelling is so great, that no wheels hitherto tried on that railway have been found sufficiently safe and durable.

Wheels of cast iron, with wrought iron tires, are found liable to crack, and to fly in pieces without any warning, and are of course dangerous for passengers; and wheels made of solid wrought iron arms, with naves and rims of cast iron, formed without the aid of borax, although hooped on the outside with wrought iron tires, are found very liable to work loose at the junctions of the wrought and cast iron, and therefore wheels with cast iron naves, and wooden spokes and fellies, surrounded with wrought iron tires, have been preferred on that railroad; but these wooden wheels are liable to wear out very fast, and require continual repairs.

For the further explanation of this invention, the Patentee has given drawings, representing two wheels, which are made according to his present improved mode, of which fig. 24, Plate IV. is a side view, and fig. 25, is a section of a wheel, having hollow spokes of thin wrought iron, made by turning up a piece of iron plate, of a suitable shape, size, and thickness, into the form of a tapering, flattened, or oval tube, with overlapping edges, which are welded together on a mandril, in the same manner as gun barrels are formed. The tubes are enlarged a little at each end, like a trumpet or bell mouth, and are prepared for the cast iron nave and rim, by carefully cleaning the ends, inside and outside, from all dirt and loose scales, and then applying a thin glazing of borax to them, either by dipping their ends into water, and sprinkling the wetted parts with borax powder or dust, so as to cover the surface of the ends, inside and outside, with it, nearly as far as the cast iron is intended to surround the wrought iron; the ends so covered with borax are to be heated by holding them in an oven or hollow fire, until the borax is fused, and flows upon the surface of the ends, so as to cover the same with a thin glazing or coat of borax; or the borax may be melted in a crucible or pot, and the ends of the tubes, after being heated, dipped into the borax, and thus become covered with a thin glazing or coating. The hollow of the said tubular spokes should be filled up with sand, except so much of the ends as are intended to have the cast iron run into them; and also one or two small holes should be drilled through each of the tubes, in order to let out the air contained within them.

The mould having been prepared from a suitable pattern of the complete wheel, the tubular arms prepared as aforesaid, are laid into those cavities of the mould which are formed by the arms of the wood pattern, with their ends projecting into the cavities of the mould formed by the nave and circular rim of the pattern, so that when the fluid iron is poured into those cavities, it will run around, and into the ends of the hollow arms, and by the fluxing action of the borax, a very firm union will take place between the ends of the wrought iron tubular arms and the cast iron which forms the nave and the circular rim of the wheel.

Figs. 26, and 27, are similar views of another wheel, the arms or spokes of which are cylindrical tubes of wrought iron, instead of tapering, flattened tubes, and they are not situated in a line with each other, but one half of them are dished, as it is termed, towards one side of the wheel, and the other half dished towards the other side of the wheel, similar to those made by Mr. Theodore Jones, under his Patent, in order to give greater lateral strength thereto. In every other respect the construction of this wheel is the same as that described in figs. 24, and 25.

It is necessary to insert three cores of dry sand across the cavity of the mould, which is left for casting the circular rim, so that when cast, it will be in three distinct segments, with small intervals between the ends of them, in order to allow for the contraction of the cast iron, which must take place in cooling.

The intervals between the three segments are afterwards filled with iron keys, accurately fitted therein and fastened, and thus form a wheel with a firm circular rim, around which the wrought iron hoop or tire is applied when hot, so that it may contract or shrink, and fasten upon the cast iron rim in cooling. The rim of the wheel may be cast hollow, if desirable, by placing dry sand cores in the mould, in proper positions, to occupy the middle part of the cavity left by the circular rim of the pattern.

The Patentee states, in conclusion, that it is needless to give any farther description of the mode of moulding or casting these improved wheels, as all competent iron founders are accustomed to such operations; and because his improved mode of making wheels for railway carriages, consists merely in the use of hollow wrought iron tubes for the spokes of such wheels, and in preparing the ends of such hollow tubes with a glazing of melted borax, to act as a flux to the wrought iron, to cause it to unite firmly to the cast iron, which is run or cast around the ends of the hollow spokes, to form the central nave and the circular rim of the wheel.

Wheels for other kinds of railway carriages may be made as above described, by apportioning them to the purpose and particular kind of tram road or rail for which they are intended, and of course, with strength corresponding with the load they are required to carry.—[*Inrolled in the Inrolment Office, October*, 1831.]

To GEORGE BARNARD, *of Bristol, builder, for his invention of certain improvements in locks and other spring fastenings for doors and other places.*——[Sealed 23d May, 1831.]

THE improvements in locks or other fastenings, described by the inventor in his specification, consist, first, in having the handle which moves the spring catch of the lock or fastening, fixed to a separate lever or crank, which acts upon an arm projecting from the catch, but distinct from it, by which means the arm may always be of the same length in all locks or fastenings, however thick the door may be; secondly, in placing the catch spring upon the front plate of the lock, fixed on to the front edge of the door, by which a much longer, and consequently more pliant spring may be used than in common; and, lastly, in having a small plate of metal cast upon or around the key, so as to get the exact impression from it, which is then brazed on to the lock plate to form the key hole, whereby the pattern of the key is so exactly formed in the key hole, that it will be found very difficult afterwards to make any other key to fit the same hole, and is therefore a great additional safeguard to prevent the lock being picked.

Plate IV. fig. 10, is a sectional plan of one of these improved locks or spring fastenings for doors; *a, a,* is the spring catch; *b,* the arm projecting from the catch on one side, and may always be of one length; *c,* is the arm which projects from the other side, the length of which must always depend on the thickness of the door; *d,* is a separate crank turning on a joint, and to this crank the handle *e,* must be fixed; upon this crank is also the fork *f,* which loosely bestrides the arm *c,* below it. It will be perceived that the position of this fork *f,* will determine the necessary length of the arm *c,* while the outer end *g,* of the crank, may be extended to any length to suit the thickness of the door. Fig. 2, is a view of the interior of one of these improved spring fastenings, shewing all the improvements claimed under this Patent; *a, a,* is the bolt or catch; *d,* is the crank before described; *h,* is a long spring acting against the front part of the catch at *i,* and fastened to the front plate *j,* the front edge of the door being cut away to allow of its necessary action. The catch may be kept locked by any common bolt, thrown by means of a key, into a mortice in the catch.

The third improvement consists of a piece of metal cast upon the key itself in the first instance, so as to get its exact form, and is then brazed, over an aperture made in the lock plate as at *n,* so as to form the key hole; *k,* is a bolt, for locking the catch, which is guided by, and acts on a centre or hinge joint at *l,* described as part of this invention, and forms the fourth and last improvement claimed by the Patentee.—[*Inrolled in the Inrolment Office,* Nov. 1831.]

To Moses Poole, *of Lincoln's-Inn, in the county of Middlesex, gentleman, in consequence of a communication made to him by a certain foreigner residing abroad, for an invention of certain improvements in steam engines, and in propelling boats and other floating bodies; parts of which improvements are applicable to other purposes.*—[Sealed 13th July, 1831.]

The object of the first improvement specified under the above Patent, is to increase the draft in the flue or chimney of the furnace of boilers of steam engines; and is effected by forcing air into the flue above or below the furnace, giving the heated air and vapour within the flue an impulse in the direction of the draft. This may be effected by various means, by bellows, condensing pumps, or any of the other ordinary modes of compressing air. The air is to be passed through one or more apertures, as may be found expedient, and should always be under material pressure. The greater the density of the air, the greater will be the increase of draft. A pressure of from one to two pounds on the square inch will in general be found efficient. The injected air acts upon and gives motion to the air contained within the chimney.

The second improvement described, relates to the piston of steam engines, and consists of a metallic piston, having a short cylinder or ring made very nearly to fit the inside of the cylinder of the steam engine; the interior of this ring is formed as part of an inverted hollow cone, having several small ribs standing out equally from the inner surfaces of it, of between half an inch to an inch long; within these small ribs is placed a portion of another cone, also open in the middle, to allow the piston rod to pass through it; this second portion of a cone is made to fit closely within the ribs of the former one. The first portion of a cone is cut through so as to admit of its opening like a ring with a joint, when the inner cone is pressed downwards, within it. The interior cone has several holes or chambers formed out of its upper surface, but not quite through it. Into these chambers spiral springs are inserted, which, with the cones, are placed between a top and bottom plate made to fit steam-tight upon them, at their edges, and a small tongue is placed to cover the opening in the outer conical ring.

The piston rod is passed through the top and bottom plates, and fixed as usual. The spiral springs press against the upper plate, and force the inner conical ring down into the outer one, acting against the ribs, and thus keeping the outer conical ring in contact with the interior of the steam cylinder.

The third improvement relates to the mode of supplying water to the boilers and condensers of steam engines, where condensers acting by exterior surfaces are used, the object being to produce a constant and uniform supply of water; this is effected by using rotatory pumps, hereafter described, called the wiper pump. These pumps are formed of two wipers, placed at right angles to each other, and of the ordinary shape, each being fixed upon a separate shaft, and at just such a distance from each other as to admit of their revolving within an enclosed case just large enough to admit of their respective rotation, and so as to keep constantly in contact with one another.

One of the ends of each of the shafts is made to work in one side of the case, their other ends being made to pass through the case to the outside, where they have a spur wheel fixed upon each, by which simultaneous motion will be given to them. These wipers are each formed, as it were, by uniting two cylinders sideways, with just so much filling up betwixt the two cylinders, as to cause the projecting part of each wiper always to revolve or work close into the hollow or concave part of its fellow.

The case is made to fit close to the wipers, sideways, or in the direction of their thickness, or the length of the cylinders, and is of nearly an oval form; the wipers are made to revolve in opposite directions, and have stuffing boxes on those parts of their spindles which pass through the case. A suction pipe opens into the under part of the case, and a force pipe into the upper part, each placed in the middle.

The wipers move in opposite directions as they revolve, and their outer extremities bring up water against the inner side of the case, and as the water cannot escape downwards between the two wipers, from their always fitting in close contact with each other, at each successive action of the pump, the water is forced through a pipe communicating into a boiler, or condenser.

The pump, above described, may be used as either a suction or force pump, and should be furnished with a valve, to prevent the escape of water when the pump is not in use, unless the pump is placed below the level of the surface of the feed water, as in steam vessels; in such case the pump may be used without any valve.

The Patentee states that part of the improvements in propelling boats, ships, or other floating bodies, consist in the use of the above mentioned improved draft piston and pump, with steam engines, for propelling such subjects, and that the said draft piston and pump may be beneficially used for various other purposes, besides that of aiding in propelling boats, ships, or other floating bodies.

The further improvement in propelling floating bodies is described to consist in the use of an oar or paddle, of the following construction:—this oar or paddle is formed of three parts—viz. the socket piece, the shaft or arm, and the blade. The socket piece is made about one-third the length of the arm, and consists of a square casting of iron, with a boss at about the middle of its length, through which boss a hole is made to fit the same, upon a shaft passing over or through the side of the subject to be propelled. This socket piece is placed vertically; the lower part of it is perforated nearly up to the middle, or to the boss; and at the upper extremity of this perforation, one-fourth of the outer part of the socket piece is cut out for some small length. This part so cut out is the forward quarter of the socket piece, next the propelled subject's side, and it is so cut out as to form a stop or stay for the united shaft, or arm and blade of the paddle, as after mentioned. The shaft bearing or carrying the socket piece, is placed at any convenient height above the water surface.

The shaft or arm of the paddle is made of iron, of sufficient strength to withstand the required action, and of sufficient length to reach nearly from the boss of the socket piece, to the level of the bottom of the subject propelled. The upper part of the paddle arm is made round, and of such dimensions as to fit well within the longitudinal perforation of the socket piece, but still to admit of its freely turning therein, and is kept in its place in the socket, by a collar and flanch at its bottom, or some other convenient mode. The lower part of the paddle shaft or arm is made round, and also tapering for some distance below the socket piece; towards the extremity it is flattened, and the blade formed of a piece of sheet iron, of an oblong form, securely fastened to it, in such manner that the edge of one of the faces of the arm shall be flush with one long edge of the blade, whilst the opposite side of the blade shall very materially overhang the opposite edge of the arm. At the upper end of the paddle arm or shaft, and at the side thereof, opposite to that side whereon the blade overhangs below, and so as to work within the aforesaid cut out quadrant of the socket piece, is fixed a strong stop or short bar.

The oar or paddle thus formed is to be subjected by any convenient method to a reciprocating forwards and retreating motion in the water, vibrating upon the arm within the boss, and need not come out of the water; for as it moves forwards it will present the thin edge of the blade to the resistance of the water, and upon its return it will present the broad surface of the blade of the paddle, the blade being kept steady in presenting its broad surface by the stop at the upper end of its arm. The water will now be forcibly driven backwards by the paddle blade, and by the consequent reaction against the paddle, the subject to be propelled will be driven forward. This paddle, as well as the aforesaid pump, may either of them be used in either a vertical, horizontal, or any inclined direction, and may be made of iron, as above described, or any other convenient material of sufficient strength.

The Patentee states, in conclusion, that he claims the benefit of originality in respect to, and consequently the right to the exclusive right of manufacturing, using, and vending, within the limits of the said letters patent, all the several aforesaid inventions of the air draft, the conical piston, the rotatory pump, and the recipocrating paddle, as above described, and their like, for all purposes whatsoever. And we think no one will deny him the full benefit so particularly claimed, excepting those persons who have long before patented the same invention; and it is a matter of doubt with us, if even they will think it worth while to dispute the right or novelty of the invention.—[*Inrolled in the Inrolment Office, January,* 1832.]

To Sampson Mordan, *of Castle-street, East, Finsbury-square, in the county of Middlesex, engineer, and* William Brockedon, *of Devonshire-street, Queen-square, in the same county, Esq. for their having invented certain improvements in the construction of writing pens and pen holders, and in the method of using them.*—[Sealed 20th Sept. 1831.]

The Patentees describe, in their specification, the object of this Patent to be, and therefore claim as their invention, the use of obliquely slit writing pens, made of quills, metals, or any other proper materials; and also the use of oblique holders for common pens, whether made of quills, steel, or other materials, such pen holders being constructed for the purpose of holding common pens in an oblique position. The advantages of the oblique position of the slits of the pens so held or made, will enable the writer to use his pen with much greater ease and freedom. These improved pens will also be found much more desirable than the common pens, chiefly in consequence of the more equal wear upon both the nibs of the pen, from the oblique position in which they are presented to the paper, both being brought equally to bear upon its surface.

The Patentees propose, in the formation of these improved oblique pens, that the slit shall be made or placed in the direction of the usual line of the slope of the letters; and also that in the improved pen holders, the slits of common pens, whether made of quills, metals, or other materials, shall be held in a similar oblique position, the pen holders being formed so as to enable the writer to fix in the holder a common pen with the usual slit in that position.

The Patentees state, that by these means they are enabled to correct what has hitherto been an evil, in using writing pens, namely, the faulty direction in which the points of pens have usually been presented to the material to be written upon, so that the nibs have not been equally used or acted upon, either in the up or down stroke in writing.

By these improved modes of forming or holding pens obliquely, the pressure of the pen is more equal on both sides of the slit, and the nibs are therefore less liable to separate or open on the up stroke of the pen, and thus the spurting of the ink will be considerably diminished, if not altogether avoided, as well as the gathering of filaments from the surface of the paper, which produces in the ordinary position of pens, the blotting or smearing of the writing; the Patentees, therefore, claim as their invention the oblique direction or position given to the slit of all pens, whether made of quills, metals, or other materials; and also the obliquity produced in the use of common pens, whether made of quills, metals, or other materials, when held in the improved oblique pen holders.

The Patentees having stated the nature and object of their invention, proceed to describe some figures or examples of different methods of carrying the same into effect.

Fig. 12, is a view of part of a common quill, as seen upon the upper side, made into one of these improved pens, with an oblique slit. Part of this oblique pen may be held in any of the usual pen holders, as a common Bramah or portable pen, as well as the steel or other elastic metal oblique portable pens, as shewn at figs. 13, 14, and 15, or in a holder contrived for the purpose, shewn at fig. 16, different from the common pen holders. The shells of this improved holder, between which the pen is held, being placed sufficiently on one side, to bring the point of the obliquely nibbed pen in a line with the centre of the handle.

Common portable pens (known as Bramah's pens), with straight slits, may be held by the improved holders, in the oblique position, in various ways.

Fig. 17, represents a common portable quill or steel pen, held in one of the oblique pen holders, shewn as seen edgewise, in fig. 18, on an enlarged scale, consisting of two elastic metal limbs *a*, *a*, united at one end to the metal socket of the handle *b*. The other ends or jaws of the elastic limbs are curved, to receive between them the portable quill or metal pen *c*, which, when placed in its proper position in the holder, will be firmly held therein by sliding the double headed button *d*, along the slits made in both limbs, near to the ends or jaws, so as to close them, and hold the pen fast between them; as shewn in fig. 17.

In order to hold a common quill pen with its barrel and stem entire, or the common metal pen in an oblique position, the jaws of the limbs of the pen holder are curved the reverse way to each other, as shewn enlarged in the edge view, fig. 19. Another pen holder, to retain the ordinary portable quill or metal pens in an oblique position, is shewn in fig. 20; and as seen edgewise in the enlarged fig. 21, it being formed of a solid stem *a*, with a socket to receive a handle *b*, and having a moveable limb *c*, turning upon a hinge or joint at its end, both parts being properly curved to hold the portable pen between them, as shewn in fig. 21. This moveable limb is retained in its closed position by sliding a metal ring *d*, upon it, as shewn in figs. 20 and 21. In order to adjust it to the best oblique position for the pen, it may be provided with a joint *e*, furnished with a tightening screw.

Fig. 22, is another pen holder adapted for holding common quill or metal portable pens, fig. 8, and consists of a short tubular or tapering plug *a*, shewn on an enlarged scale at fig. 23, fitting into the outer tube *b*, fig. 22, and has a projecting stud upon it, which fits into a slit made in the outer tube *a*, which prevents the plug from turning round within it.

A screw is formed upon the stem of the plug *a*, which passes through a hole in the end of the socket *b*, and has a thumb screw *c*, which is to be screwed upon it when the screw of the plug has passed through the hole in the socket. A portable pen may then be placed between the plug *a*, and the socket *b*, as shewn in fig. 22, and upon turning the screw *c*, tight, the pen will be firmly screwed in the holder. In order to allow more motion endwise to the adjustment of the pen in the holder, the socket may be made separate, or without a handle, and be received into an oblique springing socket or clip, with a handle affixed to it, similar to that shewn in figs. 17 and 20, and in the end view fig. 19.

Figs. 13 and 14, are top views of one kind of our oblique pens, made of a flat piece of steel or other fit and proper material, the nibs *a*, *a*, being elastic to the degree required, and the cheeks *b*, *b*, forming an exterior addition to the surface of the pen to hold a greater quantity of ink; the edges *c*, *c*, as shewn in the figs. 13 and 15, may be bevelled for the greater convenience of placing them in the pen holder, which may have jaws adapted to receive these pens, but which pen holders are not claimed as part of this invention. Fig. 14, shews one of these pens with only one additional cheek *b*, to it. Fig. 15, is a top view of a metal pen, having a convex or arch upper surface, for the purpose of obtaining a greater degree of stiffness in the parts requiring it. These pens it will be perceived may be used in the common pen holders.

It will be seen that the obliquely slit pens, and those held in the oblique holders, are required to be fixed so that the points of the pens shall be placed for convenient use in the central line or axis of the handles of the pen holders. The patentees state in conclusion, that they do not claim any of the various parts as their invention which are already known, or have been in use, but only oblique pens, whether the said obliquity be obtained by holders formed for holding the common or straight slit pens in an oblique position, or by forming the pens themselves with oblique slits.—[*Inrolled in the Inrolment Office, Nov.* 1831.]

Novel Inventions.

Improved Tail Piece for a Violoncello.

The Society of Arts have presented their large silver medal to Mr. S. A. Forster, of 34, Frith-street, Soho, for his improved tail piece of a violoncello.

This invention is an improved tail piece for violoncellos, and all instruments of a similar description, by which the vibrations are much facilitated, and the tones rendered far more equal than hitherto. Another advantage of this invention is, that in most cases it will relieve the defective notes E and F, commonly called, by the manufacturers and performers upon violoncellos, "the Wolf." This advantage is gained by tuning behind the bridge; for should one of the strings in the short space between the bridge and tail piece be either of the before named notes, or within a semitone of either of them, they will be found to be much harsher when the finger is placed upon the finger board, than if tuned to any other note in the octave. The bridges of musical instruments are not cut to a certain curve, but this improved tail piece, by being divided into four distinct parts, forms itself to the curve of the bridge, and thereby relieves the bridge of a weight with which the strings are oppressed, by the reverse direction of the strings in the old tail piece.

The tail piece of a violoncello is a thin board, usually of ebony, fixed at the end of the instrument opposite to the pegs, and to which the ends of the strings are tied or otherwise fastened. Mr. Forster's invention consists, first, in making three longitudinal cuts in the tail piece, dividing it into four bars, united only at the lower end, and sufficiently separated at the other end, to prevent them from touching while in a state of vibration, and attaching to the strings one to each of the bars. In each bar are three holes, and the string is to be fastened to whichsoever of them, on trial, shall be found to give the most perfect tone. Secondly, the material of the tail piece, instead of being of wood, as usual, is of soft hammered brass, this always being found to give freer vibrations than copper, and to be preferable to iron or steel, on account of the metallic quality of tone which attends the use of these substances.

By the above arrangement, each string being attached to its own bar, the string and bar form a continuous and distinct line, and therefore the vibrations of the different notes interfere less with each other. When the strings are tied to one common tail piece, the breaking of one puts all the others out of tune; but in Mr. Forster's invention, as each has its own bar or tail piece, the breaking of one affects the other but in a very slight degree.—*Trans. of the Society of Arts.*

Fruit Gatherer.

MR. CHARLES BUSH, of Camberwell, has been rewarded by the Society of Arts, for an improved fruit gatherer, which consists of a net made like the landing net used in angling, and is fixed upon the end of a long pole, with a hinge joint and adjusting rack, with a spring catch, to set the extending irons of the net at any convenient angle with the pole; the inside of the two outer joints of the extending iron are set at an acute angle with each other, and are formed into sharpened blades like a pair of scissors.

The best fruit is generally to be found at the top of the tree, where it is most exposed to fresh air and light; but such fruit, especially if at the end of long slender sprays, is not easily gathered by hand, and if beaten or shaken down, is commonly injured by the fall. For gathering such select fruit, instruments of various kinds have been invented, and some have already been published by the Society. It is, perhaps, not easy to contrive an instrument which shall fulfil all the required conditions; but Mr. Bush's contrivance has some points of novelty about it, and is therefore submitted to the notice of the public.

In order to use this instrument, first, let the most convenient angular position be given to the jointed frame by means of the toothed quadrant and spring catch; then raise the pole so that the fruit shall hang within the net, its stalk being between the blades. On drawing down the pole very gently, the blades will take a firm gripe of the stalk, which, if the fruit is ripe, parts from the spray, and the fruit falls into the net.

Detonating Lock.

MR. N. WATERBURY, of 26, Newcastle-street, Strand, has invented a new lock on the detonating principle, intended for firing ships' cannon. This machine is comprised in a small brass case, which is readily attached to the priming field, and is fired by a lanyard, in the same manner as practised on board of his Majesty's ships, without interfering with the line of sight. The lever by which the detonating powder is fired, is very powerful, and, as it falls immediately over the touch-hole of the gun, the inventor has given it a slight horizontal motion, by which it slips aside after falling, leaving the vent free to be stopped. One of the principal merits of this invention consists in the application of small paper cases, for containing the detonating powder, and which may be used with the common priming tube, or with powder alone. This lock is applicable to artillery of all descriptions, and should it be contemplated to introduce the detonating principle into the government service, Mr. Waterbury's invention is well worthy of consideration.

Lectiones Latinæ; or Lessons in Latin Literature.

By J. Rowbotham.

Mr. Rowbotham is already well known to the public, not only as a successful teacher, but as a scientific man, and as the author of several school books to facilitate the study of French, German, Algebra, and other branches of education. His present performance must add to his credit. Divided into four parts, the general selection is good; and the grammar, the notes, the translations, and the explanations, are all well calculated to assist the student, and impress a knowledge of the language upon his mind.

ROYAL INSTITUTION.

Mr. Cowper on improvements in the Loom for weaving figured silk.

The principle of figure-weaving consists in keeping up the warp while the weaving is going on, and then dropping these figure threads into their places again. This was illustrated on a large scale by weaving a figure with slips of paper an inch wide. The ordinary mode of raising the figure threads was explained, and the beautiful invention of the Jacquard loom was illustrated by drawings and models: by a series of threads attached to a board, a sort of working diagram was formed. In the old mode the changes in the arrangements of the figure threads were produced by certain groups of strings being knitted together, and were limited to 80 or 100; in the Jacquard loom they are produced by perforated cards. A specimen of silk was exhibited, containing 400 changes, produced by 400 cards; together with another specimen produced by 2000.

List of Patents

Granted by the French Government from the 1st of October to the 31st of December, 1831.

Continued from the London Journal of Arts, Vol. VIII. p. 173.

To M. Taillet, jun. of Lyons, for a fourth improvement on his fifteen years' patent for making ornamented stuffs.

— Michael Boche, powder horn manufacturer, of Paris, for improvements on his five years' patent for a new powder horn.

— Achilles de Bernardiere, of Paris, for a new kind of paper imitating India paper.—5 years.

— Stephen Chaix, of Paris, for a new method of roofing houses.—5 years,

— Lewis Augustus Chronier, and Alexis Saurage, of Paris, for a new fire escape.—10 years.

To Joseph Cesar Salavic, of Nimes, for a new instrument of husbandry.—5 years.

— Paul Tanson, of Paris, for a process for reviving and manufacturing animal charcoal.—10 years.

— Henry Dretzen, of Paris, for a new mechanism applicable to harps.—10 years.

— M. Philibert Damison, of Vaise, for a method of cleansing and twisting silk, and other fibrous substances-—15 years.

— John Benjamin Coquatrix, of Rouen, for a substitute for steam. —10 years.

— Augustus Girardet, of St. Etienne, for a new method of making gun barrels by machinery.—5 years.

— Daverger, printer, of Paris, for improvements on his 15 years' patent for printing music with moveable types.

— Lewis Gauthier De-la-touche, of Paris, for an elastic iron bed. —15 years.

— Julius Pamparé, of Paris, for a new method of ornamenting all kinds of woods with gold and silver.—5 years.

— Francis Henry, of Paris, for a gun firing fourteen rounds.—5 years.

— Francis Julius Devink, of Paris, for a new method of roasting cocoa and coffee by steam.—5 years.

— Joanne, of Paris, for a method of gilding and enamelling silver jewellery.—10 years.

— John Boirm, sen. of St. Etienne, for an improvement on his five years' patent for making gun barrels by machinery.

— Antoine Salmer, of Paris, for surgical instruments in India rubber.—5 years.

— Samuel Morand, of Paris, for a machine calculated to restore to every kind of tissue its original width, which may have been lessened by dying and printing.—19 years.

— Cowmeadow, Osborn, and Dalton, of Paris, for an anti-friction grease.—5 years.

— James Antoine Frigerio, of Paris, for a disinfecting apparatus. —5 years.

— Prosper Claudat Dumont, for a method of preserving houses from damp.—15 years.

— John Elijah Tignaux, for a new kind of clogs, called by him, *adiaperarte*.—10 years.

To Philip Augustus Brion, of Paris, for a new construction of fire-arms detonating several times.—10 years.

— Miss Mary Soulhanet, of Paris, for a new steam engine.—15 years.

— M. Antoine Sisco, of Paris, for a sixth improvement on his five years' patent for an instrument called *monte-resort-boite.*

— Benjamin Laignel, second improvement on his five years' patent for warming carriages in winter, and preserving them from dust in summer.

— Lewis Gauthier Delatouche, for improvements on his ten years' patent for an elastic iron bedstead.

— Nicholas Fonzi, of Paris, for improvements on his ten years' patent for burning coal in an open grate, without either smell or smoke.

— Armand Peter Seguier, for a new steam engine, applicable to navigation.—10 years.

— Paul Augustus Santereau, of Paris, for an apparatus calculated to convert oil into gas.—5 years.

— Edward Baccuet of Paris, for a mechanical count-roller for registering the number of persons who enter into a public coach.—5 years.

— Lewis Roth, of Paris, for a second improvement on his fifteen years' patent for evaporating syrups.

— Rivère, of Nantes, and Braithwaite, of London, for a method of manufacturing and crystallizing white salt.—10 years.

— James Perry, of London, represented in Paris by A. Perpigna, (French and foreign patent agent, 28, Rue Neuve, St. Augustin), for a metallic pen called *plume de Perry.*—10 years.

— Houyan, of Angers, for a new kind of steam generator, called by him *chaudiere cyllndrique verticale.*—10 years.

— Laverriere, jun. of Lyons, for a new kind of weaver's comb.—5 years.

— Nicholas Schlumberger and Co. of Guelweller, for a new card for cotton and other fibrous substances.—5 years.

— Peter Grandin, of Petit Couronne, for a machine for extracting the dye from silks, cotton, &c.—15 years.

— Count Camillus de Rochefort, of Paris, for a new method of harnessing horses.—15 years.

To Francis Coulancon, of Nimes, for a new dying composition.—5 years.

— M. John Baptist Doulay, of Raucourt, for tinning iron thimbles.—5 years.

— Nicholas Desmons, of Paris, for a tissue made with wood.—5 years.

— James Ely Munier, of Vitry le Français, for a mechanical plough.—5 years.

— Francis Terrasson de Fougeres, for machines to make bricks, tiles, &c.—5 years.

— Manesse Mallet and Co. of Valenciennes, for a method of cutting nails without loss of materials.—10 years.

Granted by the French Government from the 1st of January to the 30th of April.

PATENTS FOR FIFTEEN YEARS.

To Mr. Steinau, Maurice Louis, of Berlin, for a new kind of manure.

— Salmon, Louis Joseph, of Grenelle, for a new kind of manure.

— Merckel, Etienne George, of Paris, for a fire box called "*phlogoeaide.*"

— Fleulard, Louis Edward, of Paris, for a grinding machine called *epantritor*.

— Milan Senior, of Paris, for mechanisms calculated to facilitate the use of suspended lamps.

— Planterignes, Stephen, of Bordeaux, for a machine called *railway marin*.

— Perrin, Bartholomew, and Vernois, Benjamin, for a mechanical process of uniting and separating instantaneously, distinct articles of small dimensions.

— Souchon, John, of Paris, for a system of dying with prussiate of iron and other substances.

— Abbot, Peter Harris, of London, for improvements in the ebullition and evaporation of liquids.

— Rolland de Blomac, Constantine Mathew John Baptist, for a method of increasing tenfold the value of the husks of grapes after the last pressing.

PATENTS FOR TEN YEARS.

To Chapman, George Marcus, of New York, (represented in Paris by Mr. Perpigna, French and foreign patent agent, 28, Rue Neuve St. Augustin), for an improved system of lamps called "autogazogenous."

— Bert, Nicholas Francis, of Paris, for a portable vapour and shower bath.

— Mignard Billinge, Francis, of Paris, for a machine to open oysters.

— Philippe, Charles, of Bruxelles, for a machine to make wire nails.

— Baron d'Est, Charles Edward, of Paris, for a new method of constructing fire arms, pistols, rifles, &c.

— Widow Gerin and Co. of St. Etienne, for a new fire-arm.

— Chabert, John, and Legris, Louis, of Paris, for a portable windmill.

— Goff, John, of London, for an apparatus to clarify water.

— Poissant, Louis Basilide Sulpice, and Bermer Duchaussais, for an economical method of kneading and baking bread.

— May, George Louis, of Paris, for a method of brewing strong beer by steam.

— Louret, Gilles and Jallu, of Peronne, for an improved apparatus to distil the juice of beet-root.

— Rollé and Schwilgué, of Strasbourg, for a household pair of scales.

— Gaudin, Peter John, of Paris, for a new method of dying by mechanical means.

— Lemolt, Alexander Edward, of Paris, for a therapeutic system of electric frictions and an electric brush.

— Mathieu, Philip, of Lyons, for new fire arms called fulminating guns and pistols.

— Delareleye, Augustus, of Paris, for a lamp called by him Phœnix lamp.

— Darlu, Alexander, of Paris, for a new mechanical combination called *rotator*.

PATENTS FOR FIVE YEARS.

— Quirim, Philip, of Paris, for a method of making paper and pasteboard with straw.

To Blanchon, Marcus, for a mechanism to be used in spinning silk, and called *coupe mariage*.

— Delarochi, John Simon, for a new hearth with circulation of air, and answering the purpose of an economical back log.

— Durant, Felix Nicholas, of Sommedieue, for a powder and priming horn united.

— Say, Amable, of Paris, for the application of caoutchouc in the manufacturing of hats.

— Cautier, John Baptist, for a new machine to cut caoutchouc in its natural state.

— Delarue, Pierre Theophile, for a mechanism to be used instead of the condensers placed over lamps, and which moves round the shade.

— Viel, George Hyppolite, of Paris, for a new system of works applicable to clocks of apartments.

— Hugues, Peter, of Bordeaux, for a sewing machine on an improved plan.

— Calla, Christophus Francis, for cast iron gutters.

— Bourlet d'Amboise, for the preparation of rakachon and flower of the Asiatic acorn.

— Motte Falisse, Thomas, of Paris, for a new system of concussion applicable to fire arms.

— Ardaillon Bessy and Lallier Foret, of St. Etienne, for a method of manufacturing simultaneously a certain number of bright or Damascus iron bands to be applied on fowling pieces.

— Lehodey, Charles Bernard, of Paris, for improvements in the construction of clocks.

— Tauquier, Augustus William, of Bordeaux, for a method of teaching to write, called *French System*.

— Collet, Alexander, of Paris, for an improved carriage lamp.

— Piquenot, Peter Andrew, for a new kind of woven suspenders for gentlemen.

— Olagnon, Peter, for a batten capable of making several pieces of ribbon of all widths.

— Meugnot d'Mausouty, for a method of making iron shares to a plough to throw up the earth.

— Arnaud, Jean Antoine, for a method of preventing the quantity of silk given to be dyed from being fraudulently diminished.

To Pernot John Peter, of Paris, for several fabrics made of straws and of various colours.

— Lachaise, John, of Grandris, for a new method of cutting coats.

— Roussel, Lewis, of L'épine, for a method of extracting the last particles of sugar existing in the pulp of beet-root.

— Tschaffen and Kees, of Vienna, Austria, for a machine called a compressing lathe, applicable to the confution of plate and other purposes.

— Courties, Pierre-ès-liens, and Lasséré, Charles, of Paris, for a new rattle or coral to facilitate dentition.

— Arnaud, John Anthony, for an economical process of producing every kind of ornament with the frames, called *a la jacquart*.

— Agneroy, James, of Rouen, for a machine called a compressing stretcher.

— Bourgés, John Baptist, for an apparatus to clarify syrups.

— Fontenelle, John, of Paris, for the application of metallic tissue to the manufacturing of sieves used to clean corn.

— Sigonny, Francis, for an economical stove, equally adapted to culinary purposes, and to the warming of apartments.

— Deroche and Magnin, of Lyons, for a can made with compressed leather rendered water proof.

— Coront, Augustin, for a machine to mill silks of different sorts.

— Breuzin, Sulpice Christophus, of Paris, for an Eolipyle with a vertical flame.

— Madame Payen, of Sedan, for a prepared water used for washing and called by her *eau de rose*.

PATENTS FOR ADDITIONS AND IMROVEMENTS MADE BY THE PATENTEES.

— Millet, Andrew, for improvements on his portable fire boxes.

— Fayard, Anthony, for improvements on his warming pan to be heated with boiling water.

— Vouret, John Marie, improvement on his machine for fulling and making felt by a rotary system.

— Baccuet, Edward, improvement on his mechanical count-roller.

— Rollé and Schwilgué improvement on his weighing bridge.

— Trompette, Andrew Stephen, improvement on his method of hanging the body of a cabriolet.

To Farreau, Edme Nicholas Patient, improvement on his machine for making every kind of paper.

— Jaecond, Abraham Emmanuel, fourth improvement on his process of making axletrees contain and preserve the oil necessary for greasing them.

— Raymond, John Anthony, second improvement on his manometric lamp.

— Baccuet, Edward, second improvement on his mechanical count-roller.

— Rouen, Peter Isidore, improvement on his hydraulic pendulum.

— Hulot, John Francis, improvement on the patent purchased by him from Mr. Bourlet d'Amboise, for a prepared flour called *racahout.*

— Thilorier and Serrurot, third improvement on their hydrostatic lamp.

— Aubaud, John Baptist, improvement on his mechanical oven for baking bread.

— Mention and Wagner, improvement on their process for making black enamel.

— Arnaud, John Anthony, improvements on his economical system of producing every kind of ornaments with the frame, called *a la jacquart.*

— Millet, Andrew, second improvement on his portable fire boxes.

— Mercket, Stephen George, improvement on his fire box called by him *phlogosaide.*

— Roussel, Lewis, improvement on his process of extracting the last particles of sugar from the pulp of the beet-root.

— Neree Tellier, second improvement on his patent axletrees.

— Coquatrix, John Benjamin, improvements on the mechanism he substitutes for steam.

— Brunier, Lewis, third improvement on his hydraulic machine, called by him *hydro moteur continu.*

— Poussant and Bernier Duchaussais, improvement on their economical process of kneading and baking bread.

— Andrew Kœcklin and Co. improvement on their method of spinning and twisting, by a continual motion, wool or other fibrous substances.

To Ardaillon Bessy and Lallier Foret, improvement on their method of making plain or Damascus iron bands to be applied to fowling pieces.

— Laubereau, Felix, of Paris, improvement on his manometric lamp.

— Lanery and Charroy, improvement on their gun detonating twice with only one barrel and one platen.

— Arnaud, John Anthony, improvement on his method of extracting the last particles of sugar from the pulp of beet-root.

— Barrau, Peter Barnard, improvement on his economical sewing machine.

New Patents

GRANTED IN ENGLAND IN 1832.

To Robert Montgomery, of the town of Johnstone, in the county of Renfrew, in Scotland, for his invention of a machine for a new mode of spinning cotton, silk, flax, and other fibrous substances, communicated to him by a certain foreigner.—Sealed 26th April, 1832, 2 months for inrolment.

To Sir Charles Webb Dance, of Hertsbourne, Manor-place, in the parish of Bushy, in the county of Hertford, Knight, Lieutenant-Colonel, for his invention of certain improvements in steam boilers.—28th April, 6 months.

To John Holt, the younger, of Whitby, in the county of York, rope maker, for his invention of the application of a mode or process for preparing and manufacturing certain fibrous substances.—28th April, 2 months.

To Charles Axon, of Heaton Norris, in the county of Lancaster, cotton manufacturer, for his invention of a certain improvement in the machines called throstles and doubling frames, made from cotton, silk, linen, woollen, and other fibrous substances.—1st May, two months.

To George Goodlet, of Leith, proprietor of the London, Leith, and Edinburgh Steam Mills, for his invention of a new method of preparing rough meal, from ground wheat or other grain, previous to their being dressed for flour; also rough meal from ground barley, malt, or other grain, previous to their being put into the mash tub for brewing or distilling.—3d May, 6 months.

To Robert James Hendrie, of Blossom-street, Shoreditch, in the county of Middlesex, dyer, for his invention of an economical mode of improving dyed silk.—3d May, 6 months.

To John Heathcoat, of Tiverton, in the county of Devon, Esq. for his invention of certain new or improved methods of draining and cultivating land, and new or improved machinery and apparatus applicable thereto, which machinery and apparatus may be applied to divers other useful purposes.—15th May, 18 months.

To Charles Augustin Busby, of the Wick Road, in the parish of Stove, near Brighthelmstone, in the county of Sussex, architect and engineer, for his invention of an improved method of producing the circulation of fluids through pipes, cisterns, or other vessels, applicable to the warming or cooling the interior of buildings, and to other purposes.—15th May, 2 months.

CELESTIAL PHENOMENA, FOR JUNE, 1832.

D.	H.	M.	
1	0	0	Clock after the ☉ 2 m. 30 s.
1	0	0	☉ rises 3 h. 53 m. sets 8 h. 7 m.
1	0	0	Ceres R. A. 1 h. 39 m. Decl. 1. 17. N.
3	7	11	☽ passes the meridian.
4	16	27	☾ in conj. with ♄ long. 7. in Virgo, ☽ lat. 2. 49. N. ♄ lat. 1. 59. N. diff. of lat. 50.
5	0	0	Clock after the ☉ 1 m. 51 s.
5	2	59	☽ in □ or first quarter.
6	0	0	☉ rises 3 h. 49 min. sets 8 h. 11 min.
7	6	51	♃ rises.
7	10	23	☽ passes the meridian.
9	0	0	Vesta R. A. 9 h. 35 m. Decl. 20. 4. N.
10	0	0	Occultation *η* in Libra Im. 13 h. 53 m. Em. 14 h. 58 m.
10	0	0	Clock after the ☉ 55 sec.
10	0	0	☉ rises 3 h. 46 m. sets 8 h. 14. m.
11	0	0	Uranus R. A. 21 h. 24 m. Decl. 16. S.
11	0	41	☾ passes the meridian.
13	0	0	Pallas R. A. 23 h. 51 m. Decl. 6. 46. N.
13	0	0	Juno R. A. 10 h. 38 m. Decl. 10. 21. N.
13	0	0	Vesta R. A. 9 h. 42 m. Decl. 19. 22. N.
13	0	0	Ceres R. A. 1 h. 54 m. Decl. 2. 32. N.
13	7	44	Ecliptic oppos. or full moon.
13	8	47	♂ rises.
14	0	0	Occultation *o* in Sagitt. Im. 12 h. 30 m. Em. 13h. 42 m.
15	0	0	☉ rises 3 h. 44 m. sets 8 h. 16 m.
15	0	0	Clock before the ☉ 5 sec.
15	3	50	☾ passes the meridian.
18	0	0	☾ in Apogee.
20	0	0	☉ rises 3 h. 43 m. sets 8 h. 17 m.

D.	H.	M.	
20	0	0	Clock before the ○ 1 m. 10 s.
20	18	20	☾ in conj. with ♃ long. 25 in Pisces, ☾ lat. 4. 13. S. ♃ lat. 1 14. S. diff. of lat. 2. 59.
20	23	29	☉ enters Cancer.
21	11	14	☾ in □ or last quarter.
21	23	40	☾ in conj. with ♂ long. 20. in Aries, ☾ lat. 4. 53. S. ♂ lat. 2. 7. S. diff. of lat. 2. 46.
21	0	0	Juno R. A. 10 h. 42 m. Decl. 9. 46. N.
22	10	31	☾ passes the meridian.
25	0	0	Ceres R. A. 2 h. 9 m. Decl. 3. 40. N.
25	0	0	Clock before the ○ 2 m. 14 s.
25	0	0	☉ rises 3 h. 43 m. sets 8 h. 17 m.
25	9	31	♀ sets.
25	18	0	☿ in conj. with ♀ long. 24 in Taurus, ☿ lat. 11. N. ♀ lat. 4. S. diff. of lat. 11.
26	1	57	☾ passes the meridian
27	5	4	☾ in conj. with ♀ long. 28 in Taurus, ☾ lat. 3. S. ♀ lat. 4. S. diff. of lat. 1.
27	7	42	☾ in conj. with ☿ long 28. in Taurus, ☾ lat. 3. 1. S. ☿ lat. 41. N. diff. of lat. 3. 42.
28	0	0	☿ in Perihelio.
28	6	59	Ecliptic conj. or new moon.
29	0	0	Ceres R. A. 2 h. 13 m. Decl. 4. N.
29	0	0	Pallas R. A. 1 m. Decl. 6. 49. N.
30	5	13	☽ passes the meridian.
30	0	0	☽ in Perige.
30	0	0	♂ in Perihilio.
30	0	0	⊖ in Aphelio.
30	0	0	Clock before the ☉ 3 m. 16 s.
30	0	0	☉ rises 3 h. 45 m. sets 8 h. 15 m.

J. LEWTHWAITE, Rotherhithe

METEROLOGICAL JOURNAL

For April and May, 1832.

1832.	Thermo.		Barometer.		Rain ininches.	1832.	Thermo.		Barometer.		Rain in inches
	Hig.	Low	Hig.	Low			Hig.	Low	Hig.	Low.	
APRIL 26	45	36	29,79	29,73	,125	MAY 11	57	33	30,30	30,22	
27	53	35	29,84	29,79	,175	12	53	33	30,04	29,76	,05
28	53	28	29,73	29,63	,05	13	53	35	29,68	29,67	
29	57	36	29,53	29,49		14	53	31	29,75	29,71	,1
30	60	39	29,44	29,30		15	57	34	29,78	29,74	
						16	57	29	29,87	29,79	,35
MAY 1	55	32	29,40	29,29		17	55	34	29,86	29,76	,05
2	57	40	29,38	29,32	,575	18	62	38	30,09	30,00	,2
3	55	41	29,39	29,29	,075	19	66	29	30,11	30,07	
4	52	41	29,90	29,64	,15	20	66	34	30,16	30,12	
5	57	30	30,02	Stat.		21	70	39	30,15	30,13	
6	68	46	29,99	29,96	,075	22	70	44	30,15	30,13	
7	77	50	29,80	29,76		23	71	40	30,22	30,16	
8	65	43	29,98	29,86		24	71	45	30,23	30,20	
9	53	43	30,18	30,02		25	71	45	30,16	30,07	
10	53	33	30,33	30,24							

Edmonton.

Charles Henry Adams.

THE

London

JOURNAL OF ARTS AND SCIENCES,

AND

REPERTORY

OF

PATENT INVENTIONS.

No. III.

(CONJOINED SERIES.)

Recent Patents.

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To Thomas Knowles, *of Charlton Row, in the county of Lancaster, cotton spinner, for his having invented and brought to perfection, certain improvements in certain machinery, by aid of which machinery, machines commonly called mules, are or may be rendered what is termed self-acting, that is to say, certain improvements in certain machinery, by aid of which machinery, spinning machines, commonly called mules, are or may be worked by power, without requiring the usual application of strength of the spinners to give motion to the handles or wheels, and to such other parts of mules as are commonly worked by the strength of spinners.*—[Sealed 23d May, 1831.]

The subject of this Patent is a combination of mechanism designed to be actuated by a steam engine or other first mover, for the purpose of giving all the different evolutions to that description of spinning machinery called a *mule,* which in the ordinary way are effected by the hands of a skilful spinner. We have, in our former volumes, given literally the specifications of M. De Jongh's and Mr. Roberts's inventions for the same purpose, which are the only self-spinning mules that have been brought into practical operation; we therefore feel an obligation (though reluctantly, from the extreme length of the descriptive part), to give the specification of this invention in its complete state, and the more so, as the subject is becoming one of public interest and of legal investigation, from its supposed infringement upon the previous patent right of Mr. Roberts. The following is the Patentee's explanation:—

" Machinery, by the aid of which mules may be rendered self-acting, so as to be worked by power without the application of the strength of the spinners, has not hitherto been brought into extensive or general use in the spinning business, notwithstanding the successive inventions and patents of Mr. Eaton, Mr. De Jongh, and Mr. Roberts, all of whom have constructed such machinery, and succeeded in rendering mules self-acting thereby. But the great complication of parts in all those inventions, and the consequent expense of construction and liability to derangement, has been a bar to the general adoption of such self-acting mules in the spinning business.

" The object of my improvements in such machinery is to simplify the construction thereof, so as to enable the same to perform the requisite movements for what is called putting up the carriage of a common mule by means of fewer additional parts thereto, and by more direct application of those parts of their intended purposes than has been done in the previous inventions.

" And whereas mules which are rendered self-acting by the application of my said improvements, necessarily include many parts (and some combinations of parts) which are not of my invention, I shall point out and distinguish what I claim as my improvements, after having described the construction and operation of the whole combination of the machinery which I have used (and which I recommend to be used), for rendering mules self-acting according to my improvements.

That combination may be considered to be composed of four subordinate combinations of machinery, each of which performs a distinct portion of the manipulations required for putting up the carriage of the mule; namely, 1stly, backing off or running the spindles backwards, in order to unwind those coils which the threads make around the upper parts of the spindles where they project above the vertices of the conical cops; 2dly, running in the carriage in order to advance the spindles towards the fluted rollers which supply the rovings; 3dly, winding up the threads around the spindles in successive coils, which wrap one over another; and, 4thly, regulating the faller wire, so as to distribute the said coils of threads in the form of cops.

All the four subordinate combinations aforesaid are combined together in one general combination, which constitute what is usually termed self-acting machinery for a mule, and which is an additional apparatus, to be applied to the usual machinery of a common mule, such as is put up by the person termed the spinner, who must perform all the four operations above enumerated by the strength of his hands, without aid from the moving power of which motion is given to the mule when the carriage is coming out, and whilst it is spinning and giving twists to the threads.

My said improvements relate to the machinery or subordinate combinations of machinery which perform the backing off and the winding up of the threads; but note certain parts of the machinery which I use in those two subordinate combinations are not my invention, as I shall point out at the conclusion of this specification. And also a new improvement in the mode of working a pair of mules with self-acting machinery together, by means of which improvements the two mules will be caused to keep proper time one with the other, in coming out and putting up of their carriages, in order that the piecers may have time to piece up the ends of the threads in one mule before the other requires their attention for that purpose.

"In the following description, I shall assume that I am addressing myself to competent mechanicians, who are fully conversant with the spinning business, and with the structure and operation of common mules; and I shall confine my description to those particulars wherein the common mules require alteration in the application of additional machinery to render them self-acting according to my improvements. Almost all the parts of a mule, such as is now most commonly made in Lancashire, on the most esteemed pattern, may remain unaltered, when the same is rendered self-acting according to my improvements; but the framing of what is called the mule head, must be very firm and substantial.

"When my improvements are to be applied to mules, such as were commonly constructed in Manchester fifteen or twenty years ago, it will in most cases be advisable to make an entire new mule head upon the most improved modern pattern, with weight and strength in their frame, to render the same very substantial; but my improvements may be applied to old mules, if they are in good condition, without making an entire mule head thereto.

"The five first figures in Plate V., represent a common mule with my improvements applied thereto. The same letters and characters of reference are used in all the figures to denote the same parts. It is not necessary to enter further into a description of these parts represented in the drawings, which belong to the common mule, than to state some dimensions and proportions of one particular mule, which I have selected by way of examples from among those common rules which I have rendered self-acting by the application of my improvements thereto; and note when any dimensions and proportions are mentioned in the following description, it is to be understood to be in reference to that particular mule; and that for any other mules which differ therefrom in dimensions and proportions, corresponding differences must be made in the proportions and dimensions of my improvements, as it will be easy for a skilful mechanician to do.

"The mule represented in the drawings, and to which the following description refers, has 288 spindles. The wheel head being at the right hand end of the carriage, the spindles are 1 and ¼ inches apart, the mule having been constructed for spinning fine cops for the shuttles of power looms. And when the observations stated in the following description were taken, it was spinning weft, of that degree of firmness which is denominated No. 36, that is to say, 36 hanks (each containing 840 yards), which weigh one pound averdupoise. The spindles are a quarter of an inch diameter at the part where they project up through the upper bearing, called the bolster, and they diminish from that size, by tapering, as they rise upwards, to one-twelfth of an inch diameter at the upper ends, immediately below the points of the spindles, which points stand up six inches and a quarter high above the top of the said upper bearing. The carriage runs in and out through a space of 60 inches; the distance from the points of the spindles to the vertical centre line of the front roller, measured horizontally, is 63 inches, when the carriage is quite out, or three inches when it is quite in, and the points of the spindles are two inches five-eighths below the level of the tops of the front fluted rollers, which are one inch diameter. The drum A, at the ceiling of the room, which gives motion to the mules, makes 126 revolutions in a minute, and by an endless strap, it turns the fast or loose pulley B, of the rim or great wheel D, at the rate of 203 revolutions per minute. The rim band pulley, and the twist pulley E, make two 22-100 turns to one of the rim, or 450 revolutions per minute.

" When the carriage is coming out (and whilst the mule is spinning the threads), the spindles make seven 7-8 revolutions for each revolution of the twist pulley, consequently the spindles then make about 3550 revolutions per minute. But note, if the carriage is kept motionless, then the proportion is eight 1-16 turns of the spindles, to one turn of the twist pulley. The pulley F, at the end of the carriage, around which the endless band from the twist pulley is wrapped, is ten inches and a quarter in diameter, measuring the centre of the thickness of the endless band; and if that band is held motionless whilst the carriage is run in, through its course of 60 inches, the said end pulley will make one 86-100 turns, and the spindles will make 12½ turns. For the spindles make 6¾ for each turn of the said end pulley.

Figure 6, in Plate V, represents the form and dimensions of the cops, which are formed upon the spindles of the above mentioned mule by winding up the threads with the self-acting machinery, hereinafter to be described. The finished cop is at 500 successive times of winding up the threads, that number of layers of thread being thereby wound on the surface of the cops, so that each layer covers over the preceding layer. The first 150 stretches or times of winding up (making as many successive layers), completes what is called the full cone, that is to say the cops then acquire the form of cones, whereof the bases are the full diameter of the finished cops, namely 15-16 of an inch, the altitude or vertical height of the cone being 19-16 inches. The succeeding stretches which are wound on after the full cone is completed, form conical layers of threads, which fit one over another in succession, all of them being nearly of the same size, and the bases of those conical layers give a cylindrical form to the body of the cop, which cylinder in the finished cop of 500 stretches is 25-16 inches higher. At the first stretch, when a new set of cops is begun, the self-acting machinery must cause the spindles to make 74 turns for winding up, counting those turns after the backing off is completed, and during the time that the carriage is running through its course of 60 inches. The threads will in that case be wound up by coiling them that number of turns around the spindles, and those 74 coils will occupy 7-8 of an inch in height upon the spindles. In backing off in preparing for winding up to the second stretch, the spindles require to be turned backwards 7 times, and about 5 and 1-8 inches of the length of the threads is unwound from off the spindles in so backing off. At the 25th stretch, the successive layers of threads which have then accumulated about the spindles, will form small conical cops half an inch diameter at the base, 1 and 1-16 inches vertical height; and at that stage, the self-acting machinery must back off 6 and half turns (thereby unwinding 4 and 7-8 inches of threads, and it must then cause the spindles to make 50 turns for winding up during the running in of the carriage after the backing off is completed. The threads will in that case be wound up by the coiling them that number of turns about the cone. At the 50th stretch, the conical cops will have become increased to 5-8 of an inch diameter, at their bases, and 1 and quarter vertical height. The spindles must then back off 6 and 1-6 turns, which will unwind 4 and 5-8 inches of the threads; and after that backing off, they must make 43 turns in winding up during the running in of the carriage. At the one hundred and fiftieth stretch the full cones are 15-16 of an inch diameter at their bases and 19-16 vertical height. The spindles must then back off six turns, which will unwind 4 and 3-8th inches of the thread, and after so backing off, the spindles must make 38 turns in winding up during the remaining stretches until the cops are completed. The cones at the tops of the cops continue to be so nearly of the same size as to require but little difference to be made in the number of turns which the spindles must make in winding up the threads at each stretch, but the number of turns to be backed off must be gradually diminished as the height of the cops increase. At the 500th stretch, the spindles must make only four turns in backing off, which will unwind 2 and 1-8th inches of the thread, and after so backing off, the spindles must make 36 turns in winding up.

The above particulars relative to the mule being understood, I shall proceed to describe the self-acting machinery, observing the classification of all the parts thereof into the four subordinate combinations before mentioned, descriptive of the machinery for backing off or unwinding those coils which the threads made around the upper part of the spindles where the latter project above the vertices of the conical cops; the axis at the ceiling of the room, over the mule, has a pulley 1, fixed upon it by the side of the drum A, and by an endless strap which is crossed, it turns a pulley 2, of the same size as the pulley 1. The pulley 2 is fixed fast on a horizontal axis, which is thereby turned round without intermission, at the rate of 126 revolutions per minute; the axis 3, which I call the backing off axis, is mounted, in a small head-stock frame *a*, which is fixed fast across the head of the frame of the mule's head, nearly over the axis of the twist pulley E, to which axis the axis 3 is parallel. A small pulley 4 is fitted on the extremity of the backing off axis 3, at that end which is farthest from the carriage, and by an endless strap 14, (which is crossed) it occasionally turns a large pair of fast and loose pulleys 5 and 15, which are fitted on the extreme end of the axis of the twist pulley E; but when the endless strap 14, is upon the loose pulley 15, it turns the same the contrary way round to that in which the twist pulley E, commonly turns.

The pulley 4 is 4 and 7-8th inches diameter, and the fast and loose pulleys 5 and 15, (which I call the backing off pulleys), are 15 and ¼ inches diameter measure to the middle of the thickness of the endless strap 14; when the pulleys 5 and 15, are in action, they turn round backwards at the rate of 40 and a quarter revolutions per minute, and during the backing off the endless strap 14 is shifted upon the fast pulley 5, so as to turn the twist pulley E, round thereby, and thus cause the spindles to turn round backward, (that is in a contrary direction to the direction in which they are turned for the spinning, or for the winding up of the threads, at the rate of 325 turns per minute. But the backing off pulleys 4 and 5, are only put in action occasionally, although the axis 3, turns round continually, because the pulley 4 is fitted loose on the end of the backing off axis 3, and is only occasionally turned round therewith by means of a clutch box 6, which is fixed fast on the axis 3, being partly contained in a hollow within the pulley 4. The centre boss of the pulley has a groove formed round it to admit the prongs of a fork 13, which is fixed fast to the end of a horizontal slider 7, and projects from the slider to reach to the boss of the pulley. The slider 7 stands edgeways upwards, and it is fitted through openings in the upright parts of the headstock frame *a*, so as to be capable of sliding endways, backwards or forwards, in which case the fork 13, being fixed to it, carries the pulley 4, a short distance endways along the axis 3.—If the pulley 4 is thus moved by the slides 7, and its fork 13, towards the curve of the mule, then the teeth of the clutch box 6, which is fixed fast on the axis 3, will take into corresponding teeth formed within the hollow of the pulley 4, and the interlocking of those teeth will eompel the pulley 4 to turn round along with the axis 3, in which case the endless strap 14, of the pulley 4, will be put into motion, and will either turn the fast pulley 5, or the loose pulley 15, according as the endless strap 14, is guided upon one of those pulleys or the other. The fast pulley is fixed on the extreme end of the axis of the twist pulley E, and always turns round therewith, but the loose pulley 15 is fitted easily on the same axis, between the fast pulley and the bearing of the axis. The slider 7 is detained from moving when it is not required, to move by means of two latches 8 and 9, which are applied one at each side of that upright standard of the headstock frame *a*, which is nearest to the carriage. The two latches 8 and 9, are moveable on centre pins, which are fixed fast to the frame, and the end of the latches drop, when required, into suitable notches, which are cut in the top edge of the slider 7, close to the second upright standard. The latch 8 detains the slider 7 from returning when it has been moved as far as it will go towards the carriage, and in like manner the other latch 9 detains the slider 7, when it is moved as far as it will go the other way. The slider 7 is moved endways in its supports, when required, by means of a steel blade spring, to which it is set on a strain first in one direction and then in an opposite direction, so as to give it a tendency to throw the slider 7 first one way and then the other, according as it is required to be moved, and the motion is given to the slider 7, by the spring 10, with an instantaneous start, the moment that it is relieved by lifting its latches 8 and 9, out of the said notches in the slider. The spring 10 is fitted on one end upon an upright pin, which is fixed fast in the frame, and the blade part of the spring extends horizontally, and edgeways upwards, from that pin to the slider 7, the extreme end of the spring being reduced to a round pin, which is inserted into a hole in the slider 7. The direction of the length of the spring 10 is at right angles to the slider 7, and the middle part of the spring 10 is included between two rollers 11, 11, fitted upon two pins, each projecting upwards from a horizontal axis 12, which extends across the frame of the mule head, and the middle part of the axis 12 has a lever *c*, fixed fast upon it, and hanging down in a suitable position for the lower end of it to be acted upon by the carriage, when it gets nearly out. The carriage then pushes the lower end of the lever *b*, before it, thereby giving motion in the contrary direction to the rollers 11, above the axis 12, which rollers include the blade spring 10 between them; and that part of the blade of the spring which thus included between the rollers 11, is formed, with a double bend, so as to stand at an oblique angle to the straight part of the spring, and also to the direction in which the rollers 11, 11, are moved, when the carriage acts on the lower end of the lever *b*. The consequence of the said obliquity of the blade of the spring 10, is to cause the spring 10 to be set on a strain towards one side or the other, according as the rollers 11 are placed one way or the other by their lever *b*: for instance, when the carriage gets out it bends the spring 10, so that it tends to move the slider 7 away from the carriage; but nevertheless, the slider does not move in consequence of that tendency by the spring, because it is detained by its latch 8, before mentioned in like manner, as the cock of a gun, when full cocked, is detained by its seer.

After the carriage has got quite out, the twisting of the threads is finished, the motion of the rim and spindles is discontinued by the usual means, namely, a worm at the end of the axis of the rim D, works into the teeth of a worm wheel which is called the bell wheel or twist wheel, so as to turn the same slowly round, and on the axis C, of that wheel a finger *g*, is fixed, which turns round with the axis C, and at the proper moment the finger *g*, presses downwards upon the tail of a catch *d*, which previously detained the long horizontal lever and fork *e, e*, for guiding the endless strap of the mule, so as to have kept that strap upon the fast pulley B, of the rim during all the time that the carriage was coming out, and also after it had come out, until the proper quantity of twist was put into the threads; but by that time the said finger *g*, on the axis C, of the bell wheel will have come round in contact with the tail of the catch *d*, and will have released the same, in order that the rim and the spindles may cease to turn any longer.

Note.—The long strap, lever, and fork *e, e*, are fixed on the upper end of an upright axis, which passes down through a fixed hollow standard *f*, and on the lower end of that axis a short lever is fixed, which extends crossways of the frame beneath the same, so that the short lever at the bottom of the axis is fixed thereon in a direction at right angles to the direction of the strap lever *e*, *e*, which is fixed at the top of the same axis.

The end of the said short lever is connected by a wire spring *h*, with the lever *b*, in such manner that when the said lever *b*, is moved in the manner aforesaid by the carriage in coming out, the spring *h*, will be extended in readiness to give motion to the strap lever, and for *e*, *e*, for casting the strap on the loose pulley B, the instant that the finger *g*, on the axis *c*, releases the catch as above mentioned.

Note.—The above action of the worm and bell wheel, the catch *d*, the finger *g*, and also of the strap lever and fork *e*, *e*, with its lower lever and spring *h*, belongs to the movements of the common mule, and is no part of the self-acting machinery, but there is an additional finger *v*, fixed on the axis of the bell wheel, and at the same instant that the finger *g*, acts on the tail of the catch *a*, as aforesaid, the finger *v*, acts sideways against the curved tail or upper end of a small lever 7, which is poised on a fixed centre pin projecting out from the frame, and the lower end of the lever *z*, is connected by a wire with a short arm of a small elbow lever 16, which is mounted on a stud pin fixed to the frame, and the long arm of the elbow lever 16, reaches behind the endless strap 14, of the backing off pulleys 4 and 5, and 15; the action of those parts is to shift the backing off endless strap 14, from the loose backing off pulley B, to the fast pulley 5, at the same instant that by the ordinary movement of the mule the main endless strap of the mule is shifted from the fast pulley B, of the rim D, to the loose pulley thereof, in order to stop the motion of the spindles as usual in mules. The consequence is that the backing off endless strap 14, then begins to act on the fast pulley 5, which has been turning round with the twist pulley E, at the rate of 451 resolutions per minute, during all the time of spinning, and giving twists, hence before the twist pulley and spindles and rim have lost their swing or energy of motion, or had time to come to rest, the backing off strap 14, is shifted on to the fast pulley 5, and that strap deriving its motion from the pulley 4, is moving in a contrary direction to that in which the fast pulley 5, was moving, and in which it continues to move for a very short time, by virtue of the said swing or energy of motion remaining in all the moving machinery. The first action of the backing off strap 14, when it is thus shifted from off the loose pulley 15, to the fast pulley 5, is to retard and resist the original motion which the said fast pulley 5 retains until the second motion is stopped, and then the backing off strap 14 begins to turn the fast pulley 15 round with it in the backward direction at the rate of 40½ resolutions per minute, together with the twist pulley E, and the spindles which are thereby turned backwards at the rate of 325 turns per minute back off the threads therefrom.

Note.—The motion of the rim and spindles is stopped in less time by means of the aforesaid action of the backing off strap 14, than would be requisite to stop the motion if it were left to expend itself, for when the backing off strap 14 is shifted from the loose pulley 15 to the fast pulley 5, that fast pulley is still moving in a contrary direction to the motion of the said strap, by virtue of the energy of motion remaining in all the moving parts. The stopping of the motion of the machinery is effected quietly and without violence by the above means.

The action of stopping the motion of the spindles, and then turning them backwards with the least possible loss of time, but without violence, produces as nearly as can be, the same effect as the usual mode practised by a spinner in putting up a mule, for he applies his rough hand to the handle of the rim or wheel before it has lost its motion; and when he catches the handle he first retards, and then stops, and then turns the same backwards in order to back off. The duration of the reverse motion given to the spindles by the above machinery, is limited by the following mechanism, which is well known and which is used in other self-acting mules, namely, on the opposite end of the axis of the twist pulley E, to that whereon the fast and loose pulleys 5 and 15 are applied, a pinion *i*, is fitted, it is 29 and 1-16 inches diameter at the pitch line, and has twenty teeth to work into the teeth of a straight rack, to which is fitted into brackets fixed to the frame, so as to be capable of moving endways freely up and down in a vertical direction. The pinion *i*, is fixed fast in a circular plate *l*, and both together are fitted on the end of the axis of the twist pulley E, so as to turn round freely thereon in one direction, but not in the other direction. To effect that purpose, a ratchet wheel is fixed on the axis of the twist pulley E, close to the circular plate *l*, and a click *u*, is fitted on a stud pin, which is fixed fast into the circular plate *l*, so as to project out therefrom; and the extremity of that click takes into the teeth of the ratchet wheel *m*, and by holding fast therein, compels the pinion *i*, to turn round with the axis of the twist pulley, when the same turns backwards, thereby raising the rack *k*, upwards; but whenever the axis of the twist pulley E, turns round forwards, that is in the proper direction for spinning, or for winding up, the said click *n*, leaves the teeth of the ratchet wheel *n*, and allows the pinion *i*, to remain at rest; but nevertheless, the click *n*, will always take into the teeth of the ratchet *m*, the instant that the axis and the ratchet wheel *m*, begin to turn backwards. The click *n*, is put into action, or taken out of action with the teeth of the ratchet wheel *m*, in manner aforesaid by means of a slight spring collar, and which is made in two halves screwed together around a groove in the boss of the ratchet wheel *m*, and the screws by which those two halves are united together, bind the spring collar *o*, upon the said groove with a gentle friction. The interval between the ends of the two parts of the collar *o*, receives between them the end of a stump or short arm, which projects out from the boss of the click *n*, in a direction pointing towards the centre of the axis of the twist pulley; and when that axis, together with the ratchet wheel *m*, first begins to turn backwards, the tendency which the spring collar *o*, has to go round therewith by its friction, causes the end of the spring collar to act on the short stump or arm of the click *n*, and to throw the end of the click inwards towards the axis, so that it will catch into the teeth of the ratchet wheel, and then the click *n*, with its circular plate *l*, and pinion *i*, must altogether turn round backwards along with the axis of the twist pulley; but as soon as the second axis begins to turn round forwards, the friction of the spring collar *o*, acts in a contrary direction on the stump arm of the click *n*, and causes the end of the click *n*, to recede from the axis of the twist pulley, so as to quit the teeth of the ratchet wheel *n*, and then the circular plate *l*, and the pinion *i*, are left at liberty either to stand still whilst the axis of the twist pulley turns round forward, or else to follow round in the same direction as the axis turns, provided that they do not move so quick as to overtake the axis. In consequence of the above action of the ratchet wheel, and click, the rack *k*, after having been raised during the backing, may be let down again whilst the twist pulley E, is turning round forwards, without any impediment from the ratchet wheel *m*, and clinck *n*.

To have a complete idea of the backing off action, it is necessary here to enter into some description of a portion of the machinery of another of the subordinate combinations before pointed out, namely, that for regulating the faller wire, because the action of the faller wire is necessary during the backing off, in order to take up the slack of the threads, which are then unwound from the spindles, and to keep those threads to a proper tension until the running in of the carriage, and the winding up action of the spindles commences.

The upright rack *k*, has a small bracket *q*, affixed to it, and projecting out from it in a suitable position to reach beneath a small roller *r*, which is fitted on a pin projecting out sideways from the tail end of one of the short levers or fingers *s*, to which the faller wire F, is affixed and whereby it is extended along the row of spindles, as usual in common mules. The said lever *s*, is that one of the fingers for the faller wire F, which is at the right hand end of the carriage next to the mule head frame; the lever *s*, is affixed on the extreme end of the usual horizontal axis G, of the faller. A weight *w*, which is fastened to the tail of the lever *s*, at the same end thereof as the roller, overbalances the faller wire F, and raises the same up clear above the points of the spindles whilst the carriage is coming out, and whilst the spinning and twisting of the threads is going on; and when the carriage gets quite out, the roller *r*, will hang over the projecting bracket *q*, of the rack *k*, so that the said bracket will lift up the roller *r*, upon it, when the rack *k*, is raised by its pinion *i*, during the backing off action, before described. At the same time that the roller *r*, is thus raised, the faller wire F, (being at the opposite end of the lever *s*, descends with a corresponding motion, whereby that wire bears down the threads as they are backed off and unwound from the spindles, in order to take up the slack and preserve the threads at a proper tension; *x*, is the counter faller wire, which assists the faller wire F, in taking up the slack off the threads, it is affixed to the extreme ends of several curved arms or lever *u*, called sickles, which are fastened to an additional faller axis *t*, situated parallel to the faller axis *g*, in front thereof, or farther from the spindles, but as near to the usual axis *g*, as it can be conveniently placed, and both axis are supported by the same bearing brackets in front of the row of spindles. The sickles *u*, reach over in the spaces between the threads, and the counter wire *t*, is extended between the ends of the sickles *u*, so as to pass beneath the row of threads. The counter faller wire *x*, is constantly borne upwards beneath the threads with a moderate tension, by means of a weight, which is suspended by a small cord *y*, from an axis or portion of a pulley, which is fixed on the axis *t*, of the counter faller, and the weight hangs within in a tube, which is fixed to the front of the carriage to keep it from swinging about. During the backing off, the faller wire F, is depressed below the counter faller wire, and it carries the threads down in loops into the interval between the spindles and the counter faller wire, which wire all the time bears those threads gently upwards, and in opposition to the descent of the faller wire F. This action preserves their tension, notwithstanding the increased length which is to be extended in consequence of the unwinding of the threads from off the spindles in backing off. The backing off motion is stopped at the proper period by the following means:—A short arm is affixed to the upright rack, and projects out therefrom to support the lower end of an upright blade 17, which I call the backing off sword, and which is raised up endways along with the rack *r*; during the backing off, the lower end of the sword 17 is united to the arm of the rack *k*, by a joint pin, and the upper end of the sword 17 is continually drawn backwards by a wire spring 18, towards one of the standards for the rim. The middle part of the backing off sword 17 is received in a notch through a projecting part of the end of a long straight ruler *k*, which is called the faller guide; the sword lays flat behind that ruler, and the spring 18 bears the edge of the sword continually into the notch, whilst the sword is raised endways upwards, along with the rack *k*, during the backing off motion. When the intended number of backing off turns have been made, the sword 17 will have thus been raised to such a height through the notch at the back of the faller guide *k*, that a part which is cut away from the edge of the sword, will allow the sword to jump suddenly backwards towards the roller beam, by the action of its spring 18, with a motion about the joint pin, by which the lower end of it is united to the projecting arm of the rack *k*. When the backing off sword 17 thus makes its sudden jump backwards, its edge strikes a pin which projects out from the upper end of the latch 8, whereby the horizontal slider 7 is detained, as before mentioned; and the blade spring 10 of that slider, having been previously set on a strain by the action of the carriage against the lower end of the lever *b*, as before described, that spring 10 shoots the slider 7 endways, with an instantaneous motion, whereby the backing off pulley 4 is carried so far endways along the axis 3, that the teeth within the pulley 4 will be detached from those of the clutch box 6, consequently the pulley 4 will cease to turn any longer, and the backing off motion will cease. The same instantaneous motion of the slider 7 puts the machinery for running in the carriage into action, and the winding up machinery is also actuated by that motion of the carriage whilst it is so running in. The latch 9, drops into its notch in the slider 7, the moment after it has moved, and holds it fast from moving back again for the present.

Note.—the faller guide K, is a bar or straight ruler, which supports the roller *r*, of the lever *s*, of the faller, whilst the carriage is running in, and then the roller *r*, rolls along the faller guide K. The roller *r*, was raised up during backing off, as before stated by the bracket *q*, which projects out from the rack *k*, for the purpose of carrying up the roller *r*, which was thereby raised to a proper level to enable it to roll off from 9, on to the faller guide K, when the carriage begins to run in, because the bracket *q*, rises to a level with the top edge of the faller guide K, and there it stops in consequence of the cessation of the backing off motion, as before stated.

The faller guide K, has a suitable declivity towards the roller beam, to allow the roller *r*, to descend as it rolls along upon the faller guide K, and thus cause the faller wire F, to rise up gradually as the carriage runs in, in order that the faller wire may distribute the threads in ascending spiral coils around the cops. The faller guide K, is let down a little at every successive stretch by means hereinafter to be described, in order that the faller wire F, may be depressed less and less beneath the level of the points of the spindles at each succeeding stretch, suitable to the increased height, at which the spiral coils are required to be wound about the conical parts of the cops, increasing upwards upon the spindles. This action of building the cops, will be more fully explained along with the machinery for regulating the faller, but the above is sufficient here to shew how the gradual descent of the faller guide K, regulates what number of turns shall be made in backing off, for the notch wherein the backing off sword 17 acts, descends at the same time with the faller guide K, that notch being made in a projection at the back of the faller guide, consequently, that part of the edge of the sword 17, which is cut away (as before mentioned), in order to allow the sword to make its sudden jump backwards, will arrive at the notch at an earlier period of the backing off motion at every succeeding stretch, because the backing off motion is discontinued (in the manner before stated), the instant after the straight part of the edge of the sword gets up above the notch, whence it follows, that if the notch is placed lower down, the said cessation of the backing off motion will take place so much sooner, and consequently when a smaller number of turns have been backed off. Therefore the progressive descending motion which is given to the faller guide K, as aforesaid, in order to cause the faller wire to be depressed less and less at every succeeding stretch has a two fold object, viz. to cause the faller wire to distribute the threads higher and higher up the spindles, suitably to the increasing height of the cops, as they accumulate thread upon them, by conical layers one above another as before described; and it also diminishes the number of turns which the spindles make in backing off suitably to the diminished length of the upper parts of the spindles, which remain exposed above the vertices of the cops; for instance, at the first stretch, (see fig. 6), the faller wire must be put down so low as to lay the first coil of thread which is wound up around the spindles at only 7-8 of an inch above the upper bearing thereof. To do that, the faller guide F, must be placed at its greatest height, in order that the roller *r*, of the faller may be raised very high, when it is lodged upon the faller guide K; also at that first stretch, all the cords of thread are distributed upon 7-8 of an inch in height on the spindles, leaving 4½ inches of the upper parts of the spindles projecting up above the part where the uppermost coil of thread is wound on. Under these circumstances, when the spindles first begin to turn round for spinning a succeeding stretch, the threads will make seven spiral coils around that 4½ inches of the spindles, in climbing up the points thereof, and consequently that number of turns must be backed off at the next time of backing off. The great height at which the faller guide *k*, requires to be placed at the first stretch, in order to depress the faller to its proper place, will cause that number of reverse turns to be made in backing off, because the backing off motion, when once begun, will continue until the pinion *i*, has raised up the backing off rack *k*, and the backing off sword 17, along with that rack, until that part of the edge of the sword which is cut away, is raised a little higher up than the notch at the back of the faller guide *k*, in which notch the edge of the sword acts, and then (but not before) the sword will make that sudden jump backwards, which occasions the cessation of the backing off, in the manner before described. Note, in all cases when the backing off first begins, the lower end of the rack *k*, rests upon the floor. The arm to which the lower end of the sword 17 is jointed, is fixed to the rack *k*, at such a height thereon, that at the first stretch, when the rack is raised up above seven inches from its resting place on the floor, it will then allow the sword to make its jump backwards, and likewise the bracket *q*, fixed on the rack *h*, at such a height thereon, that the bracket will then have lifted up the roller *r*, of the faller to a proper height, to enable it to roll forwards from off the bracket on to the faller guide K, as the carriage runs in.

The pinion *i*, being two and 9-16 inches diameter, with 20 teeth, the said rise of seven inches of the rack will be performed, whilst the spindles make seven reverse turns in backing off, for the pinion is eight and 1-16 inches in circumference, and one turn of the twist pulley (or one turn of the pinion, which, when it is backing off, is the same thing), make eight and 1-16 turns of the spindles. When 500 stretches have been wound up, and the cops are completed, they occupy so much of the height of the spindles, as to have only one inch of their upper parts visible above the tops of the cops, and then the threads make only four coils round those upper parts, in climbing up to the points of the spindles. Hence only four reverse turns of the spindles are required to be made in backing off; also, at the same 500th stretch, the faller wire F, is only required to be depressed so low as will conduct the threads down opposite to the basis of the conical parts of the cops, which basis are 3¾ inches above the upper bearing of the spindles, instead of only ⅞ of an inch above the same, as was the case at the first stretch. Hence the faller wire must only be depressed so much at the 500th stretch, as will conduct the threads to the cops at 2⅞ inches less height below the points of the spindles than the place to which the said faller wire conducted the threads at the first stretch. This is accomplished by the descent of the faller guide K, which has taken place during the progress of winding up 500 stretches, which descent is about 2⅝ inches; and the same descent causes the backing off to be diminished to four reverse turns of the spindles, because the sword 17 will make its jump backwards, when the rack *k*, has risen to three inches less height, than the height to which it was raised at the first stretch; and as it was raised seven inches at first, it was only raised four inches now, and these four inches of the rise of the rack, are equivalent to four reverse turns of the spindles,

Note.—The first three quarters of an inch of the motion, wherewith the rack 9, and bracket *q*, rises, will only depress the faller wire F, so much as to bring it down to the level of the points of the spindles, and commence its contact with the threads.

Note.—That part of the edge of the sword 17, which is cut away as before mentioned, forms, as it were, a deep notch in the edge, which, when the sword makes its jump backwards, hooks over the top of the projection in which the notch is made, for the edge of the sword to act in; and by that hooking over, the sword (together with the rack *k*, and its bracket *q*), is retained from descending again when the backing off is completed, and the carriage begins to run in.. Although, in consequence of the action of the ratchet wheel and its click (as before explained), the pinion *i*, which raised up the rack (when the axis of the twist pulley is turned backwards during the backing off), offers no impediment to the descent of that rack after the backing off is finished, and the twist pulley resumes its proper motion forwards, consequently the rack, together with its bracket *q*, remain in the position to which it has been raised all the time that the carriage is running in, but when the carriage gets quite in, the sword 17 is disengaged, and the rack allowed to descend by the following means:—The carriage, when it gets nearly in, pushes before it the lower end of the lever H, which is fixed on a horizontal axis, extending across the frame, and that lever is connected by a small rod I, with the corresponding lever *b*, at the other end of the frame, so as to pull the lower end of the lever *b*, backwards, when the carriage gets in, and that action moves forwards the rollers 11, before mentioned, which are borne by the axis 12, and which include, between them, the oblique part of the blade spring 10, which spring, as before mentioned, gives motion to the slider 7, when required, in either direction. The said movement of the lever *b*, sets the spring 10, on a strain, and also by aid of a lever 21, sets the sword 17 at liberty to descend in its notch. The lever 21 is poised on a centre pin, which is fixed fast to the frame, the lower end is connected by a short link, with a lever *b*, and the upper end has a pin projecting out from it, to press against the edge of the sword 17, which it does, when the lever *b*; is moved by its connecting rod I, from the other lever H. that is, when the carriage gets quite in, as before stated.

The pin of the lever 2, having thus pushed back the, sword 17 (in opposition to its spring 18), until the edge of the sword falls into its proper notch, the sword 17, with the rack *k*, and the bracket 9, then descend altogether by their own weight, the pinion *i*, turning round upon the axis of the twist pulley, to which motion the ratchet wheel and its click make no impediment. By motion of the rollers 11, which they derive from the motion of the lever *b*, the spring 10 becomes set on a strain in that direction, which will tend to move the slider 7 endways, towards the carriage of the mule; but nevertheless, the slider 7 will not move, because it is detained by its latch 9, which is inside the headstock frame *a*, and which latch dropped into its notch, as before mentioned, the moment that the slider 7 was moved at the last time (viz. when the backing off was discontinued, in which case the slide 7 moved away from the carriage), but now it is prepared to move the contrary way, which it does by the time that the carriage gets quite in, for then the lever H, by means of its rod I, will have moved the other lever *l*, so far, that a short arm, which projects out from the central loss of the lever *b*, towards the outer end of the frame, will pass down the tail of the latch 9, so as to lift up the opposite end of that latch out of its notch in the slider 7, which slider is then shot endways by its spring 10, with an instantaneous motion towards the carriage, whereby its fork 13 carries the backing off pulley 4 endways, along the axis 3, until the teeth which are within the hollow of the pulley 4 lock into gear with the teeth of the clutch box 6, and then the pulley 4 (which had remained idle all the time since the backing off ceased, and whilst the carriage was running in), begins to turn round with the axis 3; but note, the said locking of the toothed clutch 6 into gear, is done without violence, notwithstanding that the clutch box 6 is in motion at the time, for the endless strap 14 occasions but very little resistance to the pulley 4, when the said pulley is suddenly put in motion by throwing the same into gear, because the step 14 is upon the loose pulley 15, to which it had been shifted from the fast pulley by the short lever 20, the tail, at the upper end of which, was acted upon by the slider 10, the instant after the backing off had ceased The same motion of the slider 7 puts the machinery for running in the carriage out of gear. When the slider 10 has thus moved endways, its latch 8 detains it from returning.

Note.—A spring blade is fixed to the lever H, at the lower end thereof, and the upper end of that spring is connected by a wire M, with the end of the short lever before mentioned, at the lower end of the upright axis *f*, of the strap lever *e*, *e*; that spring blade is stronger than the wire spring *h*, by which the same arm is connected with the lever *b*, and therefore the spring blade moves the strap lever and its fork *e*, *e*, so as to cast the main strap on to the fast pulley B, in order to put the rim D, in motion, and the catch *d*, holds the strap on the fast pulley until the carriage gets quite out, and has given the intended twist, and then the catch *d*, is released by the finger *g*, on the axis of the bell wheel, for that wire spring has become slack in consequence of the lever *b*. The self-acting machinery is now entirely detached and out of action, leaving the carriage to come out for spinning and twisting the threads in the usual manner of common mules.

(To be concluded in our next.)

Specification drawn by Mr. Farey

To Charles Beard, *of Cloggeshall, in the county of Essex, ironmonger, for his having invented, and found out an improvement in the construction of cocks for taps for drawing off liquids.*—[Sealed 1st March, 1832.]

The Patentee describes in his specification the object of his improvement in cocks and taps, to consist in preventing the leakage which cocks heretofore constructed are so generally subject to, and which he intends to effect by the introduction of a certain moveable plate, acting between two surfaces, formed of an elastic substance or substances, such substance or substances being introduced into two fixed hollow chambers, the surface of such elastic substance or substances acting on each side of the moveable plate which is smooth on both sides, thereby keeping up an uniform pressure or tightness and wholly preventing the leakage so generally complained of; and he further observes, that he prefers using cork for general purposes, where that substance will not be acted on prejudicially by the liquids to which the cocks may be applied.

Several modifications and adaptations of these improvements are exhibited in Plate VII. figures 1 to 20; the same letters of reference denoting similar parts in all the figures. Fig. 1, exhibits the external appearance of one of these improved cocks or taps, for drawing off any fluid matters. Fig. 2, a longitudinal section, and fig. 3, a front or end view of the same; *a*, is the barrel of the cock; *b*, *b*, two hollow chambers divided by a partition, having in the centre on one side a projecting pivot forming the axis on which the moveable plate *c*, turns. Into these chambers *b*, the elastic substance or substances *d*, *d*, are forced so as to fill up the interier (one of which is seen in the detached figure 4); the chambers and packing are each provided with apertures to allow of the free passage of the fluid matters intended to be passed off through the mouth or opening *e*, of the cock. The moveable plate *c*, is inserted between the elastic substances, and is kept perfectly close to them by the screws seen at *f*, *f*, *f*, in the outer rim or edge of the chambers *b*; this plate is also provided with an aperture corresponding with those before described, and will be clearly seen detached at fig. 5; *g*, is the lever or key for giving motion to the plate by which the cock is opened or shut; this lever acts in a notch or segment *h*, cut in the outer rim of the chambers *b*, the length of which notch or segment regulates the distance that the lever has to move so as to open or shut the cock. Fig. 6, shews the position of the lever when the cock is open. Figs. 7, 8, 9, 10, 11, and 12, exhibit the application of these improvements to lock cocks, in which the lever or key *i*, is moveable, the action of this cock is precisely similar to that last described, the difference in its construction will be clearly understood by reference to the figures. Fig. 13, exhibits a section of a cock differently formed to those last mentioned, which the Patentee terms a slide cock, and in which, instead of the revolving plate before described is introduced between the elastic packing a sliding plate *c*, which is also provided with an aperture corresponding with those in the chambers *p, p*; one of these chambers is shewn detached in fig. 14, with the elastic substance or packing fitted into it; the form of the sliding plate *c*, is shewn in fig. 15, and the manner in which it acts upon the elastic padding in figs. 16 and 17. Another modification of this invention is shewn in fig. 18, which is an external view of a "stop cock;" the interior arrangement being similar to that shewn at fig. 2, with straight ends adapted to affix to a tube or pipe.

The Patentee states, that although he has exhibited in the annexed drawing, the chambers *b*, as being partially filled with the elastic substance or substances, yet he does not mean to confine himself to the exact form therein shewn, as the chambers if completely filled with elastic substances, and the partition entirely removed would answer equally as well. The moveable plate *c*, if constructed as shewn in figs. 19 and 20, with the elastic substance or substances fitted into it on each side, the surface of such substances will act against the interier of the chambres *b*, and keep up an uniform pressure with the same effect as those before described.

The Patentee further states in conclusion, that having now described my invention, and the manner of carrying the same into effect, I would have it understood that I am aware that cork and various other elastic or suitable substances have heretofore been used in cocks to prevent leakage. I do not therefore lay claim to the introduction of such substances excepting when applied and arranged with the other parts of my invention, which I hereby declare to consist in constructing and applying the moving or sliding plates *c*, with or between two elastic surfaces as before described to cocks for drawing off liquids.—[*Inrolled in the Inrolment Office. April,* 1832.]

To JOHN POTTS, RICHARD OLIVER, *and* WILLIAM WAINWRIGHT POTTS, *all of New Mills, in the county of Derby, engravers to calico printers, and copartners, for their having invented an improved method or process of obtaining impressions from engravings in various colours, and applying the same to earthenware, porcelain, china, glass, and other substances.*—[Sealed 17th September, 1831.]

FIGURE 36, Plate VII. is a front elevation, and figure 37, a side view of a printing machine, of the description and construction generally used by calico printers, with such additions and adaptations as are used by the Patentees for the purpose of effecting their method or process; *a, a,* is the frame of the press; *b,* and *d,* fig. 37, are levers; the lever *b,* works on the fulcrum *c,* and the lever *d,* on the fulcrum *e,* supported in its headstock, which is firmly attached to the iron frame *a, a.* The end of the short arm of the lever *b,* and of the long arm of the lever *d,* are connected by joints to the ends of the connecting rod *f.* There are similar compound levers, and their connecting rods, on the other side frame; *g, g,* are the heads of the two levers *d,* and which carry the hollow cylinder *h, h,* fixed on a wrought iron shaft, which passes through its centre, its ends working in bearings in *g, g,* which slide in grooves in the heads of the levers, and can be raised and lowered at pleasure by means of the adjusting screws *i, i*; *j, j,* is an endless blanket, of the kind commonly used by calico printers, and is passed under the cylinder *h,* and also over the carrying or guide rollers *k, k, k,* being extended and guided by them in its movement in the usual manner; *l,* is an engraved copper roller, the size of which is regulated by the pattern to be engraved upon it; *m,* is a wrought iron mandril, which is passed through and accurately fitted into the roller *l,* and is made hollow, in order that it may be internally heated by the admission of steam or otherwise. The ends of the mandril work in grooves in the frame *a, a*, and upon one of them is mounted the toothed wheel *n*, to which the power is applied to work the machine, which may be done by a pinion or spur wheel mounted on a shaft, carried by arms projecting from the front of the frame, one of which is shewn in fig. 37, and which shaft may be actuated by an endless band in the usual manner; *o*, is a trough or box to contain the colouring fluid intended to be used, and has a double bottom to allow of its being heated by the introduction of steam or otherwise.

This colour-trough or box is fixed on the board or shelf *p*, which rests on two carrier pieces *q, q*, moving at one end on pivots fixed in the inner sides of the frame *a, a*, and are capable of being raised or lowered at their other ends by adjusting screws; *r*, is a wooden roller called the furnishing roller, and fixed on a shaft, the ends of which work in grooves in the ends of the colour box *o*, so that the roller may revolve in the colour box and take up a portion of the colouring fluid, giving it to the roller *l*, under which it is placed, and against which it works.

The furnishing roller in machines used by calico printers is generally covered with flannel, but the Patentees prefer it without. The size of the furnishing roller is regulated by that of the engraved copper roller, to which the colour is to be given; *s*, is a brass spur wheel keyed on one end of the shaft of the furnishing roller *l*, and works into a similar wheel, keyed on the corresponding end of the mandrel *m*; *t*, is a steam pipe leading from a boiler, through a valve, which admits the steam into the inside of the mandrel, this steam pipe has a branch pipe leading into the double bottoms of the colour box *o*.

The condensed and superfluous steam passes from the opposite end of the mandrel *m*, and colour box *o*, into the pipe *v*, by which it is carried away; these pipes *t*, and *v*, are furnished with the necessary stop cocks and valves. To prevent the escape of the steam before it enters the mandrel, the end of the connecting pieces or valves which fit into the mandrel are turned conical about two inches, and the inside of the end of the mandrel is also turned to correspond with them; a groove is also turned in the ends of the connecting pieces, to allow of packing if required. The junction of the connecting peices, and the mandrel are kept perfect by the curved arms *w, w,* one end of each of which is fixed to the frame of the machine, and the other terminates in a nut, which receives an adjusting screw, the points or end of which screw press against the connecting pieces or valves, so that when the screws are tightened, they may be firmly held and retained in their places; *x,* (see fig. 37,) is the doctor for removing the superfluous colour from the engraved cylinder, and consists of a plate of metal equal in length to the engraved roller employed, and ground nearly sharp at the upper edge. This plate is placed between two parallel plates of metal, so that the ground edge may protrude about an inch beyond them, the three plates being firmly united by screws. From each end of the doctor projects downwards a lever, shewn by dots in the figure having a cord attached to their lower ends, which is passed over the pulley *y,* carcarried by a pivot on the lever *d,* and sustains a weight *z.* The doctor is supported by two projecting pivots, which work freely in centres attached to the inside of the frame *a, a,* and which centres may be moved to and fro either horizontally or vertically, so as to adjust the situation of the doctor to the diameter of the engraved cylinder employed. It will be seen that by means of the weights *z,* and cords, the levers are elevated, and the edge of the doctor depressed, so as to bear closely against the face of the engraved roller, and scrape away the superfluous colour which the latter may receive from the furnishing roller.

Fig. 38, is a front elevation, and fig. 39, an end elevation of an apparatus for sizing the paper intended to be used in obtaining impressions; *a,* is a sizing trough, part of the front side of which is cut away; into the upper surfaces of the ends of the trough are attached the iron headstocks *b, b.*

The trough is fastened by bolts or otherwise to a common lathe bench, or other suitable bearer; *c,* is a wooden roller covered with flannel or blanket, and fixed on a shaft *d,* which works in the sides of the sizing trough, and is set in motion by any suitable power; *e,* is a similar roller resting upon and receiving motion from the roller; *c,* and the roller *e,* turns on an axis, the ends of which work under brasses moving in slots in the headstocks of the sizing machine, and may be raised or lowered at pleasure, by the adjusting screws *f*, *f*, so that the roller *e*, may be made to press more or less upon the roller *c*; *g*, is a copper roller resting on and receiving motion from the roller *e*, which receives the paper after being sized; the ends of the axis of this roller work between the two oblique guide rods *h*, *h*, which are fixed in the headstocks *b*.

The Patentees proceed to describe the mode in which their improved method or process is performed, and state that they employ paper of the same nature as that generally used by manufacturers of earthenware and glass (by which terms, wherever they herein occur, they include, and intend to designate eathenware, porcelain, china, glass, and other similar substances), as the medium by which patterns in colours are to be transferred to the articles intended to receive the same. This paper is obtained by them from the manufacturer, in sheets of indefinite length, in order that a large quantity may be impressed by one continuous operation.

In the first place, they prepare the paper by sizing, in the manner following:—

" The sizing machine being supplied with size, of the kind generally employed for this purpose, in such a quantity as may sufficiently furnish the under roller, that roller is set in motion, and in its revolutions takes up the size from the trough, a portion of which it imparts to the roller, which is made to revolve by the action of the first roller upon it, when by these means, the blanket covering of the two last mentioned rollers are saturated with the size. The end of the paper is introduced by the open part in front of the size trough, between the sizing rollers, the end of the paper being brought perfectly straight and even to the rollers, to prevent creasing. The end of the sheet being passed between the rollers, is brought up behind the second sizing roller *e*, and appearing again between that roller and the copper roller *g*, is brought up on the face of the latter, on which it will then continue to be lapped in successive layers, until the machine is stopped, or the supply of paper exhausted. As the diameter of the roller *g*, increases by the layers of paper it receives, its axis rises between the spindles, so as to adjust its situation to its varying diameter. When the required quantity of paper is thus sized, the receiving roller *g*, is taken off the roller *e*, and is placed below the cylinder of the printing machine, in the situation shewn by the dotted circle in fig. 37, where it is supported by centre points projecting from the inner sides of the frame *a*, *a*, which are, by means of an adjusting screw, connected with one of them, brought to bear tightly against the ends of the axis of the roller *g*, which are turned concave to receive them.

" In the mean time, the printing machine may have been prepared for working, by a sufficient quantity of the colouring matter, which is the same as is generally used by manufacturers of earthenware or glass, and is prepared in any of the usual modes; having been put in the colouring trough *a*, and the engraved roller, with its mandrel, and a furnishing roller of a corresponding size, having been placed on their respective bearings in manner hereinafter described and represented in the figures, the engraved roller and colour box are heated by the admission of steam to the mandrel, and to the double bottom of the colour box. The supply of the steam is furnished by the steam pipes, and is regulated or varied by stop cocks, as may be required, in order to maintain such a degree of heat as will render the colouring matter sufficiently liquid for working. The cylinder being then slightly raised by the screws *i*, *i*, the paper is then brought from the paper roller between the cylinder and engraved rollers, and fastened straight and even to the blanket, as shewn in fig. 36. The cylinder is then lowered, and suffered to press with its own weight on the engraved roller. We find this pressure sufficient, but if required, it may be increased, by placing weights on a plank, carried by the long arms of the levers *b*, as shewn in figs. 36 and 37. The moving power being now applied to the machine by the power wheel *u*, or other adequate means, the mandrel revolves with the engraved roller fitted on it in the direction of the bent arrow fig. 37, and by means of the spur wheels *s*, gives a contrary motion to the furnishing roller, which in its revolutions takes up the colouring fluid, and imparts the same to the engraved roller. The superfluous colour is scraped off by the doctor, before the engraved roller comes in contact with the paper, which then receives the impression, and takes up the colour retained by the sunk pattern on the roller *l*. The paper, as it receives the impression, is carried on by the blanket, until it passes over the carrying roller *k*, and *i*, when the end of the paper is detached from the blanket, and the continuous sheet suffered to fall down, and is cut away in portions as required.

"In applying the impressions thus obtained to earthenware or glass, to which the patterns or designs are intended to be transferred, we cut out from the paper a piece of the dimensions and figure, adapted to the surface to which it is to be applied, and it is then applied to the surface, in the method or methods now in ordinary use.

"When the pattern or design required is such as cannot be conveniently engraved on a copper roller, or by a cylinder machine, we adopt a flat plate, on which the pattern or design is engraved; and we obtain impressions on paper therefrom by means of the machine in general use among calico printers, known by the name of the "flat press," and which, as it is commonly known and used, it will not be necessary here to describe, except as far as regards the apparatus adapted for heating the plate; this we effect by substituting for the plank or board on which the copper-plate is commonly placed in calico printing, an iron box or steam chest, of dimensions adapted to the engraved plate to be used. This box or chest receives steam from a steam pipe, and parts with the condensed steam by a waste pipe, similar to those hereinbefore described, as used by us with the cylinder machine, except that inasmuch as the said steam chest has a backwards and forwards motion, the steam and waste pipes must have crank motions to follow the movements of the steam chest. The colouring matter used with this flat press may be heated in the colour box with double bottoms, of the same description as that used in the cylinder machine, or by any other similar means. The paper is sized, and applied in the same manner as hereinbefore described, and in all other respects the process resembles that performed with the flat press by calico printers.

"The advantage of our improved method or process over that at present used by manufacturers of earthenware and glass, is best shewn by contrasting the said respective methods.

"According to the method now in use, whatever patterns or designs are required, are engraved on a flat plate of copper, which, when required to be used, is placed on a flat slab, under which a stove is fixed. The plate being thus heated, the colouring material is rubbed over the plate, until the engraved pattern or design is sufficiently filled. The greater portion of the superfluous colour is then scraped off by a pallet knife, applied by hand, and the remaining superfluities are cleaned away by rubbing the plate with a dabber covered with leather. A sheet of paper, the size of a plate, is then laid over it, and the whole is passed between rollers, by the pressure of which the impression is produced. By this process a single impression, of the size of the plate employed, can only be produced by each successive operation; and as it is wholly or principally performed by hand, a much greater expenditure of time and labour is required to produce any considerable quantity of impressions, than is required by our said improved method or process, whether the cylinder machine or the flat press be used.

"Having thus described our said improved method or process as practised by us, we do hereby declare, that we do not claim as our invention all, or any part or parts of the said machines or implements we have described, the same having been by us described solely for the purpose of more clearly explaining the nature and mode of practising our said invention; and we do not claim as of our invention the process of obtaining impressions in colours, by means of the machines or implements we have described, generally or otherwise, than for the particular purpose of applying such impressions to earthenware, porcelain, china, glass, and other similar substances; and we do not claim as being by itself, or as a detached process, a part of our invention, the mode of applying impressions in colours to earthenware, porcelain, china, glass, and other similar substances, for the purpose of transferring such impressions to the same substances respectively; but we claim as of our invention the method or process, considered as one entire process of obtaining impressions in various colours from engravings, to be applied to earthenware, porcelain, china, glass, and other similar substances, by the employment and adaptation in the manner hereinbefore set forth, of the machines or implements hereinbefore described respectively, and the application of such impressions to earthenware, porcelain, china, glass, and other similar substances; and we declare, that the size, proportions, and other particulars, of and relating to the machines and implements employed by us as aforesaid, admit of various modifications, all capable of producing the same effect, and may be varied at the discretion of the constructor, according to the nature of the work to be performed."—[*Inrolled in the Rolls Chapel Office, March,* 1832.]

Specification drawn by the Patentees.

To WILLIAM PEEKE, *of Torquay, in the county of Devon, shipwright, and* THOMAS HAMMICK, *of the same place, shipsmith, for their having invented or found out certain improvements in rudder hangings and rudders for ships or vessels.*—[Sealed 21st March, 1831.]

THESE improvements in rudder hangings and rudders for ships or vessels, are designed to enable the rudder to rise with its pintles and hangings in the event of the vessel taking ground, and without the possibility of becoming unshipped or dislodged from its hangings by such accident, and also to enable the rudder, when raised under these circumstances, to be still capable of being worked with effect.

These objects are obtained by the peculiar construction of the joints or hangings that connect the rudder to the sternpost, which will be fully understood by reference to the drawing annexed; that is to say, figure 21, is a representation of the rudder A, attached to the sternpost B, and in complete working order.

Figure 22, is a section of the same taken vertically through the middle of the rudder, the joints and the sternpost; and figure 23, is a horizontal section of the rudder A, and the sternpost B, taken through one of the joints. The sternpost B, is excavated, that is cut away, and formed into a cylindrical recess, as shewn at *a*, in the horizontal section, fig. 24, for the purpose of receiving the cylindrical part of the rudder *b*, seen best in the horizontal section at fig. 25. The form and construction of the rudder will be fully understood by the side view, fig. 26, and back view fig. 27.

Having cut or otherwise shaped the part *b, b, b,* of the rudder of a cylindrical form, we then cut away portions of the wood work as at *c, c,* in fig. 26, for the purpose of enabling us to fix the socket pieces or eyes *d,* one of which is seen detached at fig. 28. These socket pieces or eyes are then made fast to the rudder by bolting their arms, as represented at *d, d, d,* in fig. 26; and the eye or socket piece is then enclosed by what we call dead wood, as fig. 29, which makes up the cylindrical part of the rudder flush as at *e, e, e,* in fig. 26, leaving only the spaces *f, f, f,* for the reception of the circular joint pieces *g, g, g,* one of which detached is shewn edgeways at fig. 30, and its horizontal appearance at fig. 31. The concave part of the sternpost is lined with a framing of metal *h, h, h,* in which a groove *i, i, i,* is made for the head or boss *k,* of the joint pieces to slide in. These joint pieces are severally attached to the grooved frame, by passing the boss *k,* through a square aperture, when they are allowed to slide down the groove until they come to their respective stops, as shewn in the representation of the hollow part of the sternpost fig. 32.

The rudder A, is now to be connected to the joint pieces *g,* and the sternpost B, which is done by bringing the rudder as fig. 26, to the sternpost fig. 33, and passing all the joint pieces *g, g,* into the spaces *f, f, f, f,* of the cylindrical part of the rudder. The joints are now to be secured by first inserting the long bolt *l,* through the eyes *m, m,* at top, and through the two upper sockets and joint piece, as shewn at fig. 22, and then introducing the several small bolts or pins *j, j, j,* in fig. 34, into the several holes *o, o, o,* and passing thence down through the respective eyes and joint pieces, as shewn in fig. 22, which firmly connects the rudder and the sternpost together; and to prevent the bolts from being thrown out by any accident, blocks or pieces of wood are inserted into the several holes *o, o, o,* which fills up and renders the cylindrical part of the rudder flush, as in fig. 21.

The particular advantage of this mode of connecting a rudder to a sternpost is, that in the event of the vessel taking ground, and the lower part of the rudder striking against the sand or a rock, instead of its being raised off its pintles or torn from its bearings, which is generally the case with the ordinary construction, the rudder on receiving pressure from below, it slides upwards with its pintles and joints all secure, the bosses of the joint pieces moving freely in the groove of the sternpost above described. In order to prevent the possibility of the rudder parting from the sternpost, by the bosses of the joint pieces falling out of the groove, the openings at which the bosses are introduced are made at different heights from the stops, so that whenever the rudder is raised up, it can never happen that more than one of the series of joint pieces shall be opposite to any of the openings, consequently the connection of the rudder to the ship is so secure, that unless the sternpost itself is torn away, the rudder cannot be displaced by accident. It is unnecessary for us to describe the mode of working the rudder by means of a tiller, as that forms no part of our invention. But it may be necessary to state that in order to work the rudder in its elevated situation, we should connect the tiller and the rudder together by a segment rack, working in a long pinion or fluted cylinder, but we do not confine ourselves to this mode of working the rudder exclusively. We may further remark that in adopting our improvements, the eye pieces or sockets *d*, may be made of the same diameter as the joint piece *g*, shewn in fig. 35, thereby dispensing with the dead wood *e*, fig. 29.

Lastly, we wish it to be understood that though we have described a peculiar mode of constructing a rudder and its appendages, which is the best mode that we are acquainted with, of adapting our improvements in rudder hangings and rudders to ships; yet we do not confine ourselves to the precise mode here shewn in all its minutia, as several variations may be devised in the detail or parts employed for adapting or applying the same principles. We therefore desire it to be understood that our improvements consist in so hanging the rudder to the sternpost, that it may be enabled to slide upwards with its hangings complete, on the application of any force below, without being unshipped from its bearings, and that it may return again to its proper situation by its own gravity, on the force being removed.—[*Inrolled in the Rolls Chapel Office, September,* 1831.]

Specification drawn by Messrs. Newton and Berry.

Original Communications.

ON THE EFFECT OF MEN MOVING IN MILITARY STEP OVER A SUSPENSION BRIDGE.

To the Editor of the London Journal of Arts, &c.

SIR,—The circumstance of a chain bridge at Broughton, near Manchester, having fallen some time ago while a party of soldiers were marching over it, although the structure was known to have been capable of sustaining a weight very much greater than the body of men at the time passing, induced me to consider the probable cause of the accident; and the conclusions to which I have arrived, not having probably occurred to many, I take the liberty of presenting them to the public through your Journal of Arts.

The most severe trial to which a suspension bridge can be exposed, is that of a body of troops marching over it in regular step. The effect they produce to strain it is twofold, besides their absolute dead weight. 1st, they must exert force, and, as it were, strike the platform at every step, to move themselves onwards; 2dly, they put the chains in motion; and when the vibrations of the chains chime in with the step of the men, they increase and strain the iron with a force far beyond any thing that could be expected from the effect of the mere weight.

The following remarks on the subject are merely speculations, for we are not aware of the existence of sufficient experimental data on a large scale to form accurate conclusions.

It is perhaps not practically very important, if considered only with reference to our bridges in Great Britain, but suspension bridges are built also in countries that are often the seat of warfare, and that are even in time of peace filled with armies. The suspension principle is very likely, moreover, to be hereafter brought into play in the erection of military bridges, which ought, of course, to be constructed with a view to the particular kind of service they will have to endure; the investigation of the effect of bodies of men crossing a bridge in step, is therefore deserving of attention.

It would be very desirable if a course of experiments could be made on the moving masses that would at different velocities break down a chain bridge. The only experimental fact on a large scale, that we are aquainted with, is the failure of the Breughton bridge, and there we have one of the main holding bolts broken by a body of sixty men marching over the bridge. The strain produced by the weight of the bridge, and the mere dead weight of the men, was under twenty tons, while the bolt, although it was less than in prudence it should have been, still, if its strength be calculated according to its dimensions, ought not to have given way under a strain of between sixty and seventy tons.

The iron of the bolt is, however, said to have been unsound, so that little can be drawn from this solitary experiment.

We will first consider the force exerted in walking, for it is clear that in walking we press the ground or the floor on which we stand with a greater force, and strain it more than when we are standing upon it at rest. The point to be ascertained, is the amount of that force at different velocities, as that whatever it is, is so much additional strain upon the chains of a suspension bridge.

It may be estimated by approximation, by comparing it to the force that would be required to put any heavy body, say a carriage on a railway, into motion. A man in walking, must at every step press on the ground with that force, which would put an inert mass of the same weight in motion, at the velocity with which he moves.

Now, the force requisite to give a body any velocity, is the mass multiplied by the height through which that mass must have fallen to have acquired the velocity with which it moves; and the height is found by dividing the velocity in feet per second by 8.02, and squaring the quotient:

Hence at three miles per hour, the height due to that velocity, is $\frac{4.4 \text{ ft. pr. second}}{8.02} = .5487$, which squared = .301 feet.

The weight of a soldier, with his accoutrements, is usually rated at 180 pounds, therefore 180 × .301 = 54 pounds, which is the weight that must *descend uniformly* through one foot to urge a body of 180 pounds weight, from rest into motion, with a velocity of 4.4 feet per second. But the pressure of the foot in walking does not act at all uniformly; on the contrary, it is a sudden, and at any considerable speed, a violent pressure, and is probably much nearer 100 pounds than 54.

Consequently it may be reckoned, that when a body of troops march over a suspension bridge, the platform has to bear a force or pressure of 100 pounds per man, at every step he takes, besides his actual weight.

Thus the effective strain exerted by 1000 men, marching at three miles per hour, would be equivalent to a load in dead weight of (280 × 1000 =) 280,000 pounds, or 125 tons.

The result brought out by this mode of calculation, corresponds tolerably with an experiment made with other views, on the *force exerted in rowing a boat.*

It has been found by trial with the dynamometer, that the *dead pull* of a man of ordinary weight and strength in rowing, was about 44 to 50 pounds; consequently the pressure on the stretcher board and seat, or points of resistence, must have been as much. Now the labour, or expenditure of animal strength in rowing, with that degree of force, is about equal to the labour of walking, at three miles an hour, with a load of 15 to 20 pounds; and the labour of walking at three miles an hour, with a load of 35 to 40 pounds (viz. about the weight of a soldier's arms and accoutrements), is of course much greater. Consequently the pressure on the ground or platform of a bridge, at every step, if it were uniform, would be from 40 to 50 pounds.

If we remember that the pull or exertion of force in rowing, is continued nearly (though not quite) uniform, throughout the stroke, whereas the pressure of the foot in walking is not exerted uniformly through one-half of the step, we shall probably be rather under-rating than over-rating the effects of marching in step, in assuming, *that a body of men, marching at three miles per hour, arms and accoutrements, weighing on an average with* 180 *pounds per man, will, besides the pressure of their dead weight, press on the platform at every step, with a force equivalent to at least* 100 *pounds of dead weight per man,* producing a total strain equal to 1.55 times their actual dead weight.

Moreover, the *extra load* of 100 pounds comes on the bridge always suddenly, being taken off at every step, and then brought on again almost with a blow of the foot, it therefore gives the bridge a sort of shock, and is more like to do injury than a greater weight brought on by degrees.

Next is to be considered how the force will vary with the speed. The force of pressure that a man or an animal must exert against the road to move himself forward, bears a relation to the velocity with which he moves, and may be guessed at, by comparing it with the *loss of power* to draw a load, that is found to take place in animals when they move at high velocities.

The force that horses are capable of exerting to draw a load, is found to diminish as their rate of going increases, according to some law not thoroughly ascertained, but which appears to be, *that the force they can exert, is about inversely as the squares of their velocities.*

The reason of their diminution of power to draw load, is simply that they consume that *force* in moving their own weight, which would otherwise be consumed in drawing extra load, and if the *power to draw load* diminishes as the squares of the velocities, that is an indication, that the force with which the animal presses on the ground to urge himself forward, *increases as the square of his velocity. It may be assumed therefore, that the pressure that animals moving themselves forwards by reaction against a road, will exert upon the ground or the platform on which they move, is directly as the weight they move, and the squares of the velocities with which they move.*

For example, if we assume as a standard the proposition, *that a body of men moving at three miles per hour, will exert a pressure equal to* 1.55 *times their actual weight,* a body of cavalry of 160 horse, weighing about 100 tons, would produce at three miles per hour, a pressure of 155 tons; and if the pressures are taken (as we assume them) to be proportionate to the squares of the velocities, the pressure exerted by the same body of cavaly charging at six miles per hour, will be to the pressure at three miles, as 36 is to 9. That is, it will be $\frac{155 \text{ tons} \times 36}{9} =$ 602 tons. And the same body of cavalry at eight miles per hour, would produce a pressure of $\frac{155 \times 64}{9} =$ about 1102 tons.

There is then further to be considered the effect of the vibration produced upon the chains. This is an uncertain thing: when a body of men move in step over a suspension bridge, if their steps happen to fall in with the waves of the vibrations, the latter are increased in energy, and produce a great strain on the iron. But if, on the contrary, the steps fall in in opposite motion to the vibrations, they check them, and render them in part, if not totally, harmless. We are not aware that the theory of the vibrations of cords has been sufficiently compared with, and corrected by, experiments on chains, heavy in themselves and loaded besides, to enable us to foresee and calculate accurately the amount of effect by vibration, that would be produced by a given body of men moving at a given velocity over a suspension bridge. Certain it is that it is very great, and should be guarded against.

The only instances, indeed, that we know of breakages in the iron work of suspension bridges, have arisen from the motion of large bodies of people, or else from the vibrations produced by gales of wind. The latter can only be guarded against by making the suspended portion of such bridges as stiff as possible; the former may be prevented by never permitting a large body of people to cross a bridge in uniform step.

For instance, suspension bridges are, or ought to be, generally made of such proportions, that their platforms might be quite filled with people, without injuring any part, provided the load be at rest; but if the same mass should begin marching in step all at once, they would probably break the bridge down. As a measure of prudence, the largest body of men that may be permitted to cross a suspension bridge in step, should never exceed one-sixth of the number that it would hold. For example, a platform of 400 feet by 30, would hold 6000 people*, 1000 of whom crossing it in step, would probably try it pretty severely.

D.

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* Carnot and Navier reckon three square feet per man for soldiers, with their arms and knapsacks. A dense crowd would not occupy more than two square feet per man.

ON STEAM CARRIAGES.

To the Editor of the London Journal of Arts, &c.

SIR,—The recent evidence before a Committee of the House of Commons having convinced the rational portion of mankind, that the employment of locomotive engines on common roads is on the eve of being accomplished, I beg leave to communicate through your columns, the result of an experiment (which strongly supports that evidence) made by Dr. Church, of Birmingham, whose scientific accuracy, combined with his well known talent for judicious mechanical arrangement, is at present directed to the adaptation of locomotive power to turnpike roads.

Any one at all conversant with the subject, must be at once aware that one of the many obstacles to be overcome, is the rapid generation of steam. In this experiment, 1 square foot of heated surface evaporated into steam 13 gallons of water in one hour.

This result is altogether unprecedented from so small an extent of surface; and it is more than the most ardent admirers of locomotion could reasonably expect ever to have seen accomplished. Pouillet in his "Elemens de Physique," gives as the greatest quantity which could be evaporated in the same time, and with the same extent of surface, 1 gallon and $\frac{23}{100}$.

The following table will exhibit the increase of effect obtained by Dr. Church's apparatus (which the present state of our Patent laws, and justice to the inventor, prevent me describing). I shall adopt the generally received notion, that 8 square feet of heated surface are necessary to boil into steam 1 cubic foot or 6¼ gallons of water in one hour; which water, when formed into steam, is considered equivalent in mechanical effect to one horse power. One square foot of heated surface is used in each of these experiments, time one hour.

Water consumed in Gallons.		Horse Power.	
$\frac{78}{100}$	=	$\frac{12}{100}$	Watt.
$\frac{90}{100}$	=	$\frac{14}{100}$	Arrow.
1 and $\frac{34}{100}$	=	$\frac{21}{100}$	Rocket.
1 and $\frac{23}{100}$	=	$\frac{19}{100}$	Pouillet Elemens de Physique
13	=	2	Dr. Church's apparatus.

The first column contains the quantity of water evaporated in one hour. The 2nd, the horse power or mechanical effect of that water. The 3rd column contains the authority. The experiments from which the above table is calculated, are contained in Wood's work on rail roads, pages 402 and 412, except the two last. From this table it results, that Dr. Church's apparatus generates 10 times more steam from the same quantity of heated surface, than the most effective locomotive engines with which the public are made acquainted, to whom I leave the inference to be deduced.

The apparatus in which this experiment was made, is formed of copper, a part being connected by solder,* and such was the facility with which this apparatus transmitted heat to the water, that the solder submitted to 1200°

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* Attached by solder in this instance merely to ascertain the influence of the heat.

Faht. remained uninjured, although its fusing point is only 340°.

From this experiment, it is certain that locomotion will be effected on common roads, this apparatus possessing the property of generating a very considerable volume of steam by a simple arrangement of parts. The rapid alterations which have taken place in locomotive machinery in the last seven years, are unequalled in the annals of progressive improvement; and it is the more astonishing when we consider these improvements have been made on that already considered bordering on perfection. But the utility of the steam engine seems capable of indefinite extension, and is now about to contribute to the happiness and prosperity of mankind, by promoting our means of rapid internal communication. The public are greatly indebted (the promoters of locomotion particularly) to the Commissioners of the London and Holyhead road for the elaborate series of experiments on the force of traction on turnpike roads, published in their seventh Report: these experiments bear ample testimony to the science of Mr. Telford and Mr. Macneill (the authors of those experiments), and give great weight to their evidence as to the applicability of steam power on common roads. One of the conclusions deduced from these experiments, is too important to be omitted, viz. "that the draught of a stage coach on a common turnpike road, increases in a less ratio than the velocity increases, and not as the square of the velocity, which many persons have supposed.

"From this it appears that the velocity of a steam carriage on a rail road, and the velocity of a stage coach on a good turnpike road, are governed by the same laws of motion, and that whatever advantage may be gained by a quick transport of passengers by means of a steam coach on the former, may also probably be attained by the same means on a well made turnpike road." page 24.

If the question rested merely on these experiments, it may be shewn that its accomplishment is not only possible but certain; for when to this favourable result of experiment, we add the increase of effect resulting from Dr. Church's discoveries, rail roads will find in common turnpike roads an insurmountable rival, and the public a cheap, secure, and rapid mode of transit.

The experiment to which this communication alludes, was made with great attention and accuracy before a scientific gentlemam of London and myself.

I am,
Your's obediently,
R. PROSSER,
Civil Engineer,

Birmingham, June 15th, 1832.

It is known to our readers that we have not entertained any very favourable notions of the practicability of running locomotive carriages on ordinary roads. The difficulties of combining sufficient strength with portability—of continually varying the power of the impelling engine to suit the undulations of the road,—of consuming the smoke, which, if allowed to escape, would be highly offensive and dangerous—and above all, of constructing a boiler within a limited space, which should be capable of generating a sufficient quantity of steam to drive the carriage seemed to present such insurmountable objections, that steam power, however desirable, did not appear likely to be made available to the general purposes of travelling, or of transporting goods, upon ordinary roads, with any prospect of advantage, or public countenance. In examining, however, the plans, and witnessing some of the experiments above alluded to, we are compelled to admit, that our previously conceived opinions are very considerably shaken; indeed, all the difficulties just enumerated are fully met, and very ingeniously obviated.

The subjects embraced by the last patent granted to Dr. Church (the specification of which is not yet inrolled), exhibit a variety of very striking and important points of improvements as connected with locomotive engines, particularly in the construction of a tubular boiler, by which the generating of steam is effected, with greater rapidity and copiousness, than by any other boiler that has been heretofore produced, of equal capacity and weight; also in the arrangement of the framing of the carriage, to support the machinery, passengers, and luggage, and the manner of connecting the parts, for the purpose of affording extraordinary stability, from a comparatively small weight of materials.

We are not at liberty, until the inrolment of the specification of this patent, to describe the particular constructions and effects of the several improved parts, but avail ourselves of the Patentee's permission to exhibit the general appearance of the carriage, at Plate VIII. as it is proposed to be constructed and made capable of conveying fifty-six persons; the machinery being enclosed, in the central part and completely hid from public view.

The form and external decorations of the bodies of the carriage which are intended to contain the passengers, may of course be varied to suit the taste, but their precise situations and dimensions are essential to the arrangements of the engine and its appendages, which, as constructed, occupy precisely the places shewn in the figure.

It is proposed immediately to incorporate a company, to work these steam carriages between London and Birmingham, and the following observations are taken from the prospectus issued for that purpose.

"The advantages to be derived by propelling carriages upon common roads by steam power have long been manifest, but the difficulties in accomplishing it have never been so far overcome as to render such application safe and profitable: the public, however, not being willing to relinquish entirely the benefits to be derived by the use of this powerful agent, have in rail-ways devised an auxiliary, which admits of its application, and in some measure compensates for the limited advance of science in this branch of mechanics. It is evident, however, that it is extremely desirable, if possible, *to dispense with this cumbrous and costly assistant,* and for the following, among many reasons, viz. 1st. The great injury done to property through which rail roads may pass, by cutting it up into convenient proportions; by disfiguring it with embankments, bridges, and other unsightly erections, and by creating a permanent nuisance from one end of the line to the other. 2nd. The great area of valuable land which will thereby be thrown out of cultivation, and irremediably lost to the country. 3rd. The great expense of constructing such roads, and of keeping them in repair. 4th. The necessity which will exist (as these roads can only be used to advantage in a level country) of changing the present places of business in many instances, and of fixing them in such situations as will be accommodated by the new lines. 5th. The inconvenience to the public of abandoning their present habits and routes, and of adjusting the pleasures and advantages of travelling to the monotonous and limited accommodations afforded by rail roads.

"Against steam carriages, properly constructed and managed, none of these objections arise. They will cause no inconvenience upon the road, and will therefore present no nuisance; they will occupy no new ground; and the saving of interest alone upon the amount necessary to make a rail road from Birmingham to London, cannot be less than £150,000. per annum, and the saving in repairs probably as much: they may be adapted to present habits and localities; may be propelled in a hilly as well as in a level country; may pass through the towns, and be brought direct to the present hotels, and inns, and places of busines, and they will possess a great advantage even over horse coaches, in being able to compensate by great speed upon the open roads, for loss of time in the towns, should it be found advisable to go through them at a walking pace; they may be light, airy, and commodious and probably as superior to the present conveniencies of travelling as steam boats are to the small river craft.

Notwithstanding the mechanical difficulties above alluded to, a very prevalent opinion exists that steam carriages will, ere long supersede other public conveyances; and this opinion has already been sanctioned and acted upon in Parliament, in a Report of a Committee of the House of Commons made in October last, and a Bill has passed that House fixing their rates of tolls.

" It is now believed that the difficulties have been overcome by Dr. Church, of Birmingham, and that he will be able to construct carriages possessing all the advantages above recited, and which will run with perfect case and safety at any speed and with any weight likely to be required, *and which will not only not injure the roads, but constantly improve them.*

" That an ample field is open for a Steam Carriage Company between London and Birmingham, *and without materially injuring the present great vested interests,* is clearly shewn by the returns published by order of the directors of the projected Railway Company; by which it appears that the annual expense of travelling and carriage between those places amounts to the enormous sum of one million six hundred and forty-four thousand pounds; the number of passengers being four hundred and eighty thousand, and the quantity of goods one hundred and thirty-eight thousand tons; a small proportion of which would satisfy the most sanguine expectations of a Carriage Company, but a sufficient portion of which could be performed to render other new modes of conveyance unnecessary.

" With these views, the proprietors within this district of Dr. Church's inventions, as applicable to steam-power, have concluded to establish a company to run carriages both for goods and passengers, between the places abovementioned, and to apply to Parliament for an Act of Incorporation. They have farther determined *to set aside one-fourth of the shares* for appropriation to coach proprietors, carriers, and persons engaged in traffic on the roads, and to other persons able to benefit the Company who may apply for them.

It being estimated that the amount of one year's interest upon the capital required for a Rail-road will be more than sufficient for all the purposes of the Company —and it being also desirable that the total sum for which a shareholder is to be liable shall be small and fixed definitively, and that the payment of it be gradual, the capital is divided into 10,000 shares of £20 each, to be called for in sums not exceeding £1. per share at any one time, and at intervals of at least three months between every call.

The business of the Company to be managed by a Board of Directors, to be chosen by ballot by the shareholders, at an annual general meeting, to be held upon the first Tuesday in February.

Applications for Shares may be made personally, or by letter, to Messrs. Rottons and Scholefields, who will be ready by the 4th of June to receive the payments and grant receipts.

The following gentlemen have been appointed Provisional Directors for the present year, with power to add to their number:

John Rotton, Esq.; Mr. Joshua Scholefield; Mr. Henry Van Wart; Mr. Joseph Stock; Mr. S. A. Goddard.

Should an Act of Parliament not be obtained, the undertaking is, nevertheless, to be prosecuted under such regulations as the shareholders and their legal advisers may deem fit.

LEGAL OPINIONS ON THE PATENT LAWS

COURT OF KING'S BENCH.

Wednesday June 27th.

Sittings before Mr. Justice Pattison and Special Juries.

JONES v. PEARCE.—Mr.—Godson opened the case. This was an action for an infringement of a patent, to which the defendant pleaded *no infringement*.

Sir James Scarlett stated, that the plaintiff, Mr. Jones, had invented a new and improved description of carriage wheels, for which he took out a patent in 1826. [For a description of Jones's improvements on wheels, for carriages, see vol I. Second Series page 154, and Plate VII.] Mr. Jones's wheel was made entirely of iron, and the utility of the invention was so obvious, that it was coming into very general use. At first it was confined chiefly to waggons, or other heavy carriages, but it was found that even in the lighter carriages it would be of very great advantage. Mr. Jones had a manufactory for the making of these wheels at Vauxhall, and the business, as the utility of the invention became gradually known, greatly increased. But as always happened in these cases, when an invention came into very general use, the ingenuity of men was exerted to appropriate to themselves the benefit of that which they had not the genious to invent.

Mr. Watt had to fight many battles before he established his patent for the steam-engine; and a short time ago a kind of machine had been invented for shearing cloth, and the utility was so obvious, that it was almost universally adopted. An attempt was made to infringe that patent, and this brought the question of its originality into this Court. It was then proved that something like it had been invented before, and a model of such a machine was brought from America, and referred to as being constructed on the same principle. But then these other machines had never been brought into general use, and Mr. Justice Bayley had observed on the occasion, "If I have discovered a useful machine, and have got a patent for it and brought it into general use, my patent is not to be set aside by showing that some other man has invented something of the same kind, but which has never been brought into general use." So in the present case, none of the wheels constructed on the principle of Mr. Jones's wheel had ever been brought to that degree of perfection that rendered them generally useful.

The general principle was of this nature. In ordinary carriage wheels the weight was supported by the spoke or spokes, which happened to be immediately under the box or nave of the wheel, while the other spokes supported no part of the weight. But in the plaintiff's wheel, the weight, by means of iron rods, was suspended from the top or upper part of the wheel, so that a portion of the weight was supported by every one of the spokes or rods, except those that were directly parallel to the horizon.

The defendant carried on a wheel manufactory at Tavistock, in Devonshire, and had thought proper to avail himself of this great improvement of Mr. Jones, to the injury of the patentee.

A patent for fourteen years was the mode which had been appointed by law for the reward of those ingenious men who made useful mechanical discoveries, but the more generally useful they were, the greater was the disposition to infringe the patent, and deprive the original inventor of his well merited reward. In the cases of the steam-engine, and the cloth shears, the attempt had been defeated, and he hoped that the defendant's attempt would meet with the same fate. He would call several distinguished engineers, who would tell the Jury that the invention was most useful, and quite new in its application.

The patent and the specification were then put in and proved in the usual manner.

Mr. Brunel, the celebrated engineer, was then called. The specification, he said, was very clear, and the wheels might be made from it by any ordinary workman. The invention is very useful, and is new in its application. He had seen wheels of a similar construction, and on somewhat the same principle—such as the water-wheels of Strutt, of Derbyshire. He had seen a wheel of a construction similar to that which was called Mr. Strutt or Mr. Seton's wheel tried in a carriage by the father of the present King of France, but that was a mere trial, and the use of the wheel had not been persevered in. Mr. Jones's wheel was the first of the kind that had been generally used for carriages.

Cross-examined: Seton's wheel was on the same principle as that of Mr. Jones; that is, the weight, in both the one and the other, was suspended by iron rods from the upper part of the wheel, instead of resting on the spoke immediately under the nave: but then Mr. Jones's wheel had many mechanical niceties which rendered it not only immediately useful, but very durable. The other wheel, made as it had been, was not calculated to be durably useful, He had observed that Mr. Jones's wheel was rapidly advancing into general use.

Mr. Field, who had been an engineer for 20 years, gave evidence to the same effect.

Mr. Tyrell, an engineer, described the principle to be *suspen-*

sion, but said that the plaintiff's patent was not merely for the principle, but also for the construction and useful application. A child putting a curtain ring upon a rod, and pulling down the curtain, acted on the principle, but to no beneficial effect.

Mr. Marineau, a partner in an extensive brewing concern, stated that they had employed the plaintiff's wheels for three years, and found them very useful and economical. Their establishment saved about 187*l.* a year by the use of these wheels, and the use of them has been rapidly becoming general.

Mr. J. Ford, a wheel wright for thirty seven years, and a member of the Wheel wrights' Society, had never head of anything like the plaintiff's wheel before; it was very useful; he had never been in Derbyshire.

— Pym: Had carried on the business of a wheelwright in Derby for forty years, and never heard of such a wheel as this of Mr. Jones.

William Brooke, foreman in plantiff's manufactory, went to Tavistock, in Devonshire, and discovered that the defendant, an ironmonger there, had pirated Mr. Jones's invention, and made suspension-wheels exactly of the same kind.

Mr. Campbell, for the defendant, rested the defence on the fact that the invention was not that of Mr. Jones, but that of Mr. Strutt, of Derbyshire; and for nearly two years before the date of Jones's patent, a carriage had been drawn about on the highways with wheels of this description. The wheels had attracted considerable attention, although there might be many people in Derbyshire who had never seen or heard of the invention. Mr. Strutt, the inventor, was dead; but if the action could be maintained against the present defendant, Mr. Jones might have maintained an action against Mr. Strutt himself, if he had been alive. Mr. Strutt did not keep the invention secret, but made it public, and any one who pleased might have used it. A gentleman of the name of Seton had also used a wheel of the same description before the date of this patent, so that the principle was perfectly well known before; and if Mr. Jones had invented an improved construction, he ought to have taken out a patent for that improvement separately and distinctly, and not for the principle, to the invention of which he had no claim whatever. The only question was whether the invention had before been made public.

Thomas Alcock proved that suspension water wheels had been long ago used at the establishment of the Messrs. Strutt, at Belper, near Derby, and that Mr. Henry Strutt had, in 1814, suggested the application of the same principle to carriage wheels.

Mr. Justice Pattison: This was an action for the infringement of a Patent which was taken out by the plaintiff, in 1826, for an improvement of wheels for carriages. It was admitted that the specification was clear, and that the invention was very useful; and the only question, therefore, was, whether the invention was new, and was for the first time applied to general and public useful purposes, by the plaintiff. His Lordship then recapitulated the evidence, and observed, that the suspension principle was evidently known long ago, and if the patent had been only for the principle, it could not be supported. But what the plaintiff claimed was, the invention of *a method of constructing wheels on that principle* in such a manner that they, for the first time, became generally useful.

There was no evidence that the plaintiff, however, saw Mr. Strutt's wheel before he took out his patent. Then, was the invention new? As to that, all the witnesses agreed that Mr. Strutt's wheel was on the same principle; but the plaintiff's witness said that Mr. Strutt's wheel was defective in certain particulars which the plaintiff's wheel possessed, and that it was in consequence of these particulars that the wheel had become generally useful.

These witnesses also represented, that supposing the patent to be good, the defendant's was essentially like the plaintiff's, and an infringement of the patent.

Verdict for the plaintiff.

New Patents

GRANTED IN ENGLAND IN 1832.

To Grant Preston, of the Minories, in the city of London, nautical brazier, for his having invented an improvement or improvements in ships' compasses. — Sealed May 26th, 2 months for inrolment.

To Frederick Steiner, of Church, near Blackburn, in the county palatine of Lancaster, manufacturing chemist and turkey red dyer, in consequence of a communication from a foreigner residing abroad, for an invention of a certain process or processes, by which spent madder or madders that have been previously used, can be made to yield a great quantity of colouring matter, and for dying with the same various colours all descriptions of cotton, linen, wool, silk, or any mixture of them; and also for improving for dying madders that have not been previously used.—2d June, 2 months.

To William Hubie, of the city of York, joiner and cabinet maker, for his having found out or invented an improved mangle.—2d June, 2 months.

To Joseph Alexander Taylor, of George-street, Hanover-square, Esq. for his having invented an improved whipstick or cane, to be used when riding.—5th June, 2 months.

To John Sylvester, of Great Russell-street, in the county of Middlesex, engineer, for his having invented certain improvements in apparatus for raising the temperature of air to warm and ventilate buildings.—5th June, 2 months.

To Hugh Bolton, of Sharples, in the parish of Bolton le Moors, in the county of Lancaster, carder, for his having invented an improvement in machinery used for carding cotton, and other fibrous materials.—5th June, 2 months.

To Jacob Perkins, of Fleet-street, in the city of London, engineer, for his having invented certain improvements in blowing and exhausting air applicable to various purposes.—9th June, 6 months.

To George Lowe, of Brick-lane, Old-street, in the county of Middlesex, civil engineer, for his invention for increasing the illuminating power of such coal gas as is usually produced in gas works; also for converting the refuse products from the manufacture of coal gas, as is usually produced in gas works, into an article of commerce not heretofore produced therefrom; and also for a new mode of conducting the process of condensation in the manufacture of gas for illumination.—9th June, 6 months.

To William Brown, of Liverpool, merchant, in consequence of a communication made to him by a certain foreigner residing abroad, for an invention of certain improvements on steam engines.—9th June, 6 months.

To Harriot Grant Gillet, widow of the late Augustus Whiting Gillet, of Birmingham, in the county of Warwick, merchant, in consequence of a communication made to her late husband by a certain foreigner residing abroad, of a new or improved machine or instrument to measure, beat, and give the accents in all the different moods of tone, with any degree of velocity required applicable to the teaching of music.—June 28th, 6 months.

CELESTIAL PHENOMENA, FOR JULY, 1832.

D.	H.	M.	
1	0	0	Clock before the ☉ 3 m. 28 s.
1	13	47	♃'s second satellite will immerge
2	2	46	☽ in conj. with ♄ long. 9. in Virgo, ☽ lat. 3. 8. N. ♄ lat. 1. 55. N. diff. of lat. 1. 13.
4	0	7	☿ passes the meridian.
4	11	33	☽ in □ or first quarter.
5	0	0	Clock before the ☉ 4 m. 12 s.
6	14	10½	♃'s first satellite will immerge.
6	0	0	☉ rises 3 h. 45 min. sets 8 h. 15 min.
7	0	0	♃ rises 10 h. 53 m.
7	0	0	Saturn sets 10 h. 37 m.
7	18	24	♂ passes the meridian.
7	23	38	♀ passes the meridian.
10	0	0	Clock before the ☉ 4 m. 59 sec.
10	12	29	Jupiter's fourth sat. will im.
11	0	0	☉ rises 3 h. 53 m. sets 8 h. 7. m.
11	0	0	Uranus 21 h. 21 m. R. A. 16. 11. S. dec.
11	0	0	Vesta 10 h. 27 m. R. A. 15. 15. N. dec.
11	0	0	Juno 11 h. 5 m. R. A. 8. 1. N. dec.
11	0	0	Pallas 0 h. 6 m. R. A. 6. 28. N. dec.
11	0	0	Ceres 2 h. 27 m. R. A. 5. 52. N. dec.
12	10	0	☽ in Apogee.
12	10	55	Ecliptic opposition or ○ full moon.
13	0	0	☽ passes the meridian 12 h. 49 m.
13	3	24	Saturn passes the meridian.
13	16	24	Jupiter passes the meridian.
13	18	15	♂ passes the meridian.
13	23	45	♀ passes the meridian.
13	0	50	☿ passes the meridian.
15	0	0	☉ rises 3 h. 57. sets 8 h. 3 m.
15	0	0	Clock before the ☉ 5 m. 35 sec.

D.	H.	M.	
16	2	21	☽ passes the meridian.
17	0	0	Uranus 21 h. 21 m. R. A. 16. 9. S. dec.
17	15	50	☽ passes the meridian
17	0	0	Jupiter stationary.
18	3	7	☽ in conj. with Jupiter long. 27. in Pisces, ☽ lat. 4. 20. S. Jupiter lat. 1 23. S. diff. of lat. 2. 57.
19	0	0	Vesta 10 h. 42 m. R. A. 13. 52. N dec.
19	0	0	Juno 11 h. 15 m. R. A. 7. 13. N. dec.
19	0	0	Pallas 0 h. 8 m. R. A. 6. 0. N. dec.
19	0	0	Ceres 2 h. 35 m. R. A. 5. 20. N. dec.
20	0	0	☉ rises 4 h. 2 m. sets 7 h. 28 m.
20	0	0	Clock before ○ 5 m. 59 s.
20	10	2	☾ in □ or last quarter.
20	17	42	☽ in conj. with ♂ long. 2. in Aries, ☽ lat. 5. 17. S. ♂ 2. 13. S. diff. of lat. 3.4.
22	10	22	☉ enters Leo.
22	12	27	Jupiter's first sat. will immerge.
25	13	45	Jupiter's third satellite will immerge.
26	10	55	Jupiter's second sat. will immerge.
26	17	0	☽ in Perigee.
27	0	0	☉ Eclipse visible, see note*
27	1	56	Ecliptic conj. ● or new moon.
29	14	21	Jupiter's first sat, will immerge.
29	16	51	☽ in conj. with Saturn long. 13 in Virgo, ☽ lat. 3. 27. N. Saturn lat. 1. 53. N. diff. of lat. 1. 34.
29	0	0	♀ in Perihilio.
30	0	0	Clock before the ☉ 6 m. 5 s.
30	0	0	☉ rises 4 h. 16 m. sets 7 h. 44 m.

J. LEWTHWAITE. Rotherhithe

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* See note in following page.

* ECLIPSE OF THE SUN.

July 27.—An Eclipse of the Sun, visible at Greenwich. Beginning of the Eclipse 2 h. 3¼ m. P, M. ; greatest obscuration 2 h. 15⅛ m.; visible conjunction 2 h. 16 m. ; end of the Eclipse 2 h. 28⅛ m. ; digits eclipsed 0.12⅛ m. on the Sun's southern limb. In Scotland and in our northern counties there will be no eclipse. At Paris the part eclipsed will be ⅜ of a digit. This will be a large and total Eclipse within the Tropics. The planet Venus will be only 44 m. 32 sec. from the Moon's northern limb, at the time of the central Eclipse on the meridian.

J. L.

METEROLOGICAL JOURNAL

For May and June, 1832.

1832.	Thermo.		Barometer.		Rain ininches.	1832.	Thermo.		Barometer.		Rain in inches
	Hig.	Low	Hig.	Low			Hig.	Low	Hig.	Low.	
May 26	70	46	30,07	30,00		June 11	67	41	29,81	29,70	,125
27	67	39	29,96	29,84		12	69	43	29,60	29,46	,35
28	72	43	29,96	29,87		13	70	54	29,49	29,46	,175
29	69	40	29,84	Stat.		14	71	52	29,66	29,56	
30	64	41	29,86	29,69	,225	15	67	51	29,92	29,86	,2
31	65	38	29,57	29,45	,3	16	70	51	30,03	29,96	,1
June 1	59	43	29,61	29,56	,175	17	73	51	30,03	Stat.	,025
2	68	35	29,84	29,66	,1	18	77	53	30,06	30,03	
3	69	49	29,76	29,54		19	74	50	30,06	30,02	
4	63	49	29,46	Stat.	,025	20	74	51	29,96	29,92	
5	63	48	29,53	29,46	,225	21	70	45	29,90	29,84	
6	61	45	29,46	Stat.		22	67	51	29,62	29,58	,45
7	59	43	29,51	29,49	,025	23	67	49	29,70	29,60	,175
8	62	40	29,69	29,57	,775	24	69	47	29,89	29,76	
9	65	44	29,76	29,70	,05	25	69	47	29,99	29,95	
10	63	40	29,83	29,75	,1						

Edmonton.

CHARLES HENRY ADAMS.

Latitude 51 deg. 37 min. 32 sec.
Longitude 3 „ 51 „ West of Greenwich.

THE

London

JOURNAL OF ARTS AND SCIENCES,

AND

REPERTORY

OF

PATENT INVENTIONS.

No. IV.

(CONJOINED SERIES.)

Recent Patents.

To Thomas Knowles, *of Charlton Row, in the county of Lancaster, cotton spinner, for his having invented and brought to perfection, certain improvements in certain machinery, by aid of which machinery, machines commonly called mules, are or may be rendered what is termed self-acting, that is to say, certain improvements in certain machinery, by aid of which machinery, spinning machines, commonly called mules, are or may be worked by power, without requiring the usual application of strength of the spinners to give motion to the handles or wheels, and to such other parts of mules as are commonly worked by the strength of spinners.*—[Sealed 23d May, 1831.]

(*Continued from page* 123.)

The parts and actions above described of the self-acting machinery, have no operation whatever on the common article of the mule, whereby the carriage latches into gear when it gets in, and prepares for coming out again; all which, together with the coming out and twisting after it is carried out, is done in the usual manner, excepting that the worm wheel, called the bell wheel or twist wheel, is not always engaged with the worm at the end of the axis of the rim D, for the end of the axis and of the bell wheel, is supported in the end of an elbow lever L, which is moveable about a stud pin fixed into the standard for the axis of the rim, and the lower end of the lever L, is acted upon by a short lever, which is fixed on the extreme end of the axis 12 of the lever *b*, when the carriage gets nearly out and presses towards the lower end of the lever *b*, as before described, in order to set the spring 10 on a strain, then the short lever on the end of the axis 12 presses against the tail of the elbow lever L, and raises up the end of the axis C, until the worm wheel takes into gear with the worm at the end of the axis of the rim; and after the worm wheel is so put into gear, it acts in the same manner as is usual with mules, to cause the main driving strap to be shifted on to the loose pulley, as soon as the proper quantity of twist is put into the threads, and in addition thereto the axis C, brings the backing off machinery into action by means of the extra finger *v*, as before described, which shifts the backing off strap 14 from the fast pulley 5, to the loose pulley 15, but not when two such mules are worked together in a pair, by means of an improvement hereafter to be described; then the said shifting of the backing off strap 14 will be retarded, by what I call a detaining latch, to be hereinafter described, in all cases when the two mules are not keeping proper time one with another, in respect to the coming out and going in of the carriage; but if the mules are keeping proper time, then the additional finger *v*, causes the backing off machinery to be put in action at once, when the carriage runs in and leaves the lever *b*, at liberty, then the short lever on the end of the axis 12 of that lever, allows the elbow lever L, to drop at the end of the axis, and so far as to take the worm wheel out of gear with the worm, and then a chain and weight, which is applied to the rim of a pulley, which is fixed on the axis C, pulls that axis and its fingers *g*, and *v*, round, so as to place them in a proper position for putting them again into gear, when the carriage gets nearly out at the next stretch.

Description of the Machinery for running in the Carriage.

The axis 3, by means of a pair of mitre wheels N, which are about four inches diameter, with thirty teeth, turns an inclined axis O, at the opposite end of which is a bevel pinion of sixteen teeth, to turn a bevel wheel P, of 48 teeth, which is 7¾ inches diameter; that wheel is fixed on an axis, which extends horizontally across the frame, and a scroll Q, is fixed upon the axis to receive two cords R, and S, which are conducted opposite ways over two leading pulleys at each end of the frame, and the ends of the cords are made fast to the carriage with wind up pins to adjust the length of each cord R and S; the scroll Q, is a double spiral curve, which sets out at the radius of 13-8 inches, measured from the centre of the axis to the middle of the end, and after making the turns, the radius, by enlarging continually, becomes 6¾, which is the largest radius, and then the radius begins to diminish again by a similar curvature, but of contrary flexure, until after making 1¼ turns, the radius becomes 13-8 inches, as at first.

Note.—The curvature of the scroll, for nearly 1-6th of a circle, on each side of the largest radius of 6¾ inches, conforms very nearly to an arch of a circle described about the centre of motion. There are two separate grooves in the edge of the scroll Q, to receive the two cords R and S, which wind contrary ways above the scroll; the bearing for the upper end of the inclined axis O, is fastened to the slider 7, and when that slider is moved endways by its spring 10, in order to throw the backing off pulley 4 out of gear, and discontinue the backing off motion as before described, the mitre wheels N, are brought into gear, and they transmit motion with a diminished velocity to the scroll Q, which by winding up the cord R, runs the carriage in. At first starting, the cord R, winding on the small radius of the scroll nearest to the centre thereof, puts the carriage into motion quietly, and without any jerk; but as the carriage runs in, the cord R, gradually winds upon an increasing radius, so as to move the carriage quicker with an accelerating motion, until it gets about half way in, and then the carriage is moved at its quickest rate of running in, in consequence of the cord R, being drawn by the largest radius of the scroll; after the carriage has completed half its course, it begins to run in slow, as it advances further in, the velocity of motion continually decreases, until it gets quite in, by which time the smallest radius of the scroll comes into action, and moves the carriage slowly up to its stops, without violence or jerk. The varying rapidity of motion which is obtained by running in the carriage by the said scroll, is very similar to the motion which spinners give to the carriages of common mules, in putting up the carriages by hand. When the carriage gets quite in, the slider 7 is moved, by first setting its spring 10 on a strain, and then releasing the catch 9, in the manner before mentioned, and thereby the mitre wheels N, are taken suddenly out of gear, leaving the scroll guide at liberty to be turned backwards by its cord 5, which has no other office to perform than to turn the scroll round backwards whilst the carriage is coming out, until the scroll reaches its proper starting place, which is when the carriage is quite out, and then it is ready to begin its action of running the carriage in again, for another succeeding stretch: that action being begun, as before explained, by the mitre wheels N, locking into gear, by the same movement of the slider 7, which caused the cessation of the backing off motion.

Note.—The machinery for running in the carriage is already used in the self-acting mules, and forms no part of my improvements.

Description of the Machinery for winding up the Threads.

It has already been stated, that if the carriage is run in whilst the drum band is held motionless, the end pulley F, will be turned round so much by its action against the stationary cord, in a similar manner to the action whereby a carriage which is turned round upon its own axis, when it is running along a road, as to produce 12½ turns of the spindles during the running in of the carriage, through its course of sixty inches, by the ordinary action of a common mule, without any regard to self-acting machinery; also that the spindles require to make 74 turns during the said running in of the carriage, to wind up the threads at the first stretch, when those threads must be coiled round the bare spindles; and also that the spindles must make 36 turns during the said running in of the carriage, in order to wind up the threads at the 500th or last stretch, when those threads must be coiled round the cones at the top of the cops.

The machinery for winding up must be calculated to increase the said 12½ turns of the spindles, which would be produced without its aid to 74 turns of the spindles at the first stretch, when the greatest number of turns is required, and to 36 turns at the 500th stretch, when the least number of turns is required; therefore the machinery for winding up, must give 61½ turns of the spindles during the running in of the carriage at the first stretch, and 23½ turns of the spindles at the 500th stretch. On the axis of the twist pulley E, a pinion 24, of 38 teeth, is fixed, in order to be worked by the teeth of a spur wheel 25, of 80 teeth, which is situate nearly beneath the axis of the twist pulley E; a small cylindrical roller 26, called the winding up barrel, is fixed upon the same axis as to the spur wheel 25, which axis is mounted between two arms which project out from each end of a hollow axis 27, in order to form a frame to receive the wheel 25, and the winding up barrel 26; the axis 27 of that barrel is supported on a horizontal centre pin or bolt put through the leg of the framing of the mule head, and the other end of the bolt is sustained by a small upright standard between the legs of that framing.

The spur wheel 25 can be engaged with the teeth of the pinion 24, or disengaged therefrom, by raising or lowering the frame in which the axis of the barrel and spur, which is mounted; which raising or lowering is performed by moving the said frame around the centre pin of the hollow axis 27, by which the frame is supported. For that purpose one of the arms, which projects out from the axis 27, is connected at its end by a small rod or upright link 28 to the horizontal arm of an elbow lever 29, which plays upon a stud centre pin fixed to the framing at the outside thereof, and the upper end of the upright arm of the elbow lever 29, is perforated to receive the extremity of a pin 30, which projects out from the back of the slide 7, being fixed firmly in that slider; the action of these parts is to put the teeth of the spur wheel 25 in the axis of the winding up barrel 26, into gear with the teeth of the pinion 24, in the axis of the twist pulley, by the same change of gear which occasioned the cessation of the backing off; and also the commencement of the running in of the carriage, viz. when the slider 7 is suddenly moved in a direction away from the carriage, it puts the mitre wheel N, and the pinion 24, and wheel 25, in gear at the same instant, and also disengages the backing off pulley 4 from its clutch box 6, on the axis.

Note.—The link 28 is adjustable in length by a screw to regulate it so that the mitre wheel N, and the pinion 24, and spur wheel 25 will run properly in depth gear, at the same time the twist pulley must make 80-30 or 2'-100 turns to one of the winding up barrels; and as the spindles make 8-16 turns to one turn of the twist pulley, it follows that the spindles must make 57 turns to one turn of the winding barrel, when the spur wheel 25 thereof is in gear with the pinion 24, a cord 31, called winding up cord, is coiled around the winding up barrel 26, and the other end of the same cord 31 is coiled round a spiral fusee 32, whereof the axis, which is vertical, is mounted in a suitable frame 33 at the end of the carriage of the mule. To understand the action of winding up the threads at the first stretch, when 74 turns of the spindles must be made during the running in of the carriage, it is not necessary to contemplate any action of the fusee 32, because that fusee does not then turn round much about its axis; but the winding up cord 31, may be considered as if it were made fast to the carriage, so that the carriage in running in through a space of 60 inches, will draw after it 60 inches in length of the winding up, and 31 in receding from the winding up barrel 26; and the said cord being coiled around the barrel 26, the drawing off of the cord must turn that barrel round, and that turning motion is transmitted by the spur wheel 25, and pinion 24, to the twist pulley, with a multiplication of 2 and 11-100 times, and therefrom the spindles are turned with a further multiplication of 8 and 11-16, or in the whole the turning motion given to the winding up barrel by so drawing off the cord 35 from it, is transmitted to the spindles with a multiplication of 17 turns, as before stated. The winding up barrel 26 is 27 inches in circumference, to the middle of the thickness of the cord 31; therefore the 60 inches length of that cord which the carriage pulls off in the above case from the barrel would cause it to turn round 3 and 53-100, which number multiplied by the 17 turns that the spindles make, as aforesaid, to one of the barrel, shews that the spindles will be turned round 60 times during the running in of the carriage, by virtue of the winding up machinery, to which number must be added the said 12½ turns which the spindles derive from the common action of a mule, independently of any self-acting machinery thereto; and it gives 72½ turns, which is rather short of the 74 turns which are requisite, and hence if the machinery were to act as above supposed, the threads would be wound up a little too slack about the spindles. To explain how that deficiency is made up, the action of the fusee 32, which was before assumed to have no action, must be included in the calculation; the fusee 32 is turned a little round about its axis, by means hereinbefore explained, during the running in of the carriage, the turning being in that direction, and to that extent of turning motion which will cause the fusee to coil or gather up a short length of about 1¼ inches of the leading end of the cord 31, about the spiral groove of the fusee, which 1¼ inch is so much additional length of cord to be drawn off from the barrel 26, beyond the 60 inches, which are drawn off therefrom by the receding motion of the carriage before stated; and that extra 1¼ inches of cord so drawn off, in consequence of the action of the fusee, will cause such an addition to the said calculated number of turns made by the spindles, as will cause them to make the proper number of 74 turns.

The necessary turning motion of the fusee 32, about its own axis, is thus produced (see Plate VI. fig. 1, of the drawings). Beneath the spiral groove 32 of the fusee, wherein the winding up cord 31 coils, the fusee is formed with a cylindrical barrel part 34, around which barrel part a cord or chain 35 is coiled, the end of that cord or chain being made fast to the circumference of the barrel 34. The other end of the cord or chain 35, passes horizontally from the circumference of the barrel part 34 of the fusee beneath the carriage in the direction of the length thereof, and makes a half turn around a pulley or sheave 36, and then returns horizontally parallel to its former course, and the extremity is made fast to the frame 37 which supports the fusee, and which frame is fixed beneath the carriage, so as to be part thereof. The end of the cord or chain 35 is secured to a winding up pin 38, or a screw by which the length of that part of the cord or chain which is in action can be adjusted. The sheave 36 is mounted on an upright centre pin in the space between the two plates T, which are fastened together to form a frame for the sheave, and that frame is fitted in the manner of a slider, to move horizontally endways, backwards and forwards, in a groove, which is formed between the two long rails 37, which rails are fixed horizontally, as before mentioned, beneath the carriage. The slider T, containing the sheave 36 within it, is moved along endways in the said groove, when it is required to do so, by means of a long rule V, which is placed horizontally and flatways beneath the carriage, its length being either in the direction in which the carriage runs, or else obliquely to that direction, as is represented in Plate VI. fig. 2. The said rule V, is supported at each of its ends at X and Y, to bear its weight, and hold it fast at any obliquity at which it may be placed. The middle part of the rule V, passes through the opening in the slider T, without touching any part of the slider, but the roller W, is mounted on an upright centre pin in the space between the upper and lower part of the slider T, and the roller lies within the opening of the slider T, in the same manner as the sheave 36 does, but the sheave 36 is at that side of the ruler V, which is nearest the fusee at the end of the carriage, and the sheave does not touch the rule, but the roller W, is at the opposite side of the ruler, and applies with its circumference to the edge of the rule, so as to roll along the same when the carriage is run in or out, and the tension of the cord or chain 35 will keep the said roller W, always in contact with the edge of the rule V, which edge, when the rule is placed obliquely, as is represented in sheet IV, will act in the manner of an inclined plane to the roller W, whilst the carriage is running in, and will then allow the slider T, to move in its groove 37, by the tension of the cord 35, in a direction towards the fusee at the end of the carriage, whereby the sheave 36 will give up a portion of the cord 31 to the barrel part 34 of the fusee as the carriage runs in, and the barrel part will wind up that said portion of cord around itself, by the tension to which the cord 31 is subjected, when, by pulling it off from the winding up barrel 26, it turns that barrel round, in order to give motion by the spur wheel 25, and pinion 24, to the twist pulley, and therefrom to the spindles, as before described. The same tension of the cord 31 will cause it to pull off and unwind itself from the spiral groove 32 of the fusee, as far as ever the cord 35 will allow the fusee to turn round about its own axis, but how far that will be, depends upon how much the edge of the inclined rule V, will allow the roller W, and the slider T, to move along in its groove 37 during the running in of the carriage.

The effect of the above combination of parts is, that the edge of the rule V, when it is placed in an oblique direction to the running in of the carriage, will allow the slider T, to move in its groove towards the fusee when the carriage is running in, and by the aid of the sheave 36, the motion thus allowed to the slider T, is caused to allow twice as much length of the cord 35 to be given up to the cylindrical part 34 of the fusee, as the inclined edge of the rule V, allows the slider T, to move along in its groove 37. Whatever length of the cord or chain 35 is thus yielded up to the barrel part 34, it allows the fusee to turn round to a corresponding extent about its own axis, by virtue of the tension of the winding up cord 31, a portion of which unwinds itself from the spiral groove of the fusee, thereby giving out a portion of that cord 31 at the leading end thereof, viz. at that part thereof which is coiled round the spiral groove of the fusee. All the length of the cord so given out by the spiral groove 32 of the fusee, is a deduction from what would otherwise be drawn off from the winding up barrel 26. For instance, at the 150th stretch, when the full cones are completed, the rule V, must be set at that degree of obliquity which is represented in fig. 2, and during the running in of the carriage, it will allow the roller W, and slider T, to move about 15¾ inches in its groove towards the end of the carriage; the sheave 36 causes the cord or chain 35 to yield up twice as much as 31½ inches to the barrel part 34 of the fusee, and that allows the whole of the fusee 34, 32, to make about 2½ turns about its own axis; whereby the fusee unwinds, and gives out from its spiral groove 35 inches in length of the cord 31, consequently when the carriage runs in through its course of 60 inches, instead of pulling off and unwinding that length of the cord 31 from the barrel 26, it draws off only 25 inches; therefore which is 35 inches less than the run of the carriage, because the spiral groove fusee, by unwinding 2¼ turns, has given out 35 inches of the cord 31, at the end which is opposite to that end which winds about the barrel 26. The 25 inches of the cord 31, which is actually drawn off from the barrel 26, during the 60 inches run of the carriage, will cause the spindles to make 25½ turns, to which, adding the 12½ turns which are produced by the common action of the mule, independently of the self-acting machinery, gives 38 turns of the spindles during the running in of the carriage, as is required.

The end of the winding up cord 31 is made fast to the spiral groove of the fusee, at the interior end thereof, nearest the centre of motion, so that the cord 31, as it unwinds and pulls off from the spiral, acts continually at a less and less distance from the centre of motion of the fusee, owing to the spiral form of the groove 32 of the fusee, it gives out the winding up cord 31 in unequal portions of length, to corresponding equal portions of the space run over by the carriage towards the roller beam. The portions of cord which are given out at the first commencement of the running in of the carriages are the longest, and they shorten gradually as they get towards the interior end of the spiral. The spiral groove of the fusee gives the requisite variation of the turning motion of the spindles during the running in of the carriage, to suit the conical form of the cops, about which the threads are to be wound. The curve of the spiral groove of the fusee is accurately represented at fig. 3, on a larger scale, and from that drawing a proper fusee may be constructed.

Note.—When the cord 31 unwinds from that part of the spiral groove which is 3, radius to that part which is 13·8 radius, 35 inches length of the cord will be unwound.

Note.—If the 60 inches that the carriage runs is supposed to be divided into nine equal spaces of 6⅔ inches each, then the numbers 1 to 9, which are marked on the cord 31 in the frame, shew the progressive lengths of cord which will be given out whilst the carriage runs in each of these spaces, by unwinding from off 2¼ turns around the spiral grooves of the fusee.

Note.—On the extreme end of the axis of the barrel 26, another smaller barrel E, is fixed, and a cord A, which winds round the barrel E, in a reverse direction to the cord 31, is conducted over the suitable leading pulleys B, and loaded with a balance weight D, which acts continually to draw and keep the cords 31 and 35 tight, whilst the carriage is coming out, and when the spur wheel 25 is disengaged from its gear with the pinion 24. At that time the fusee and winding up barrel are turned backwards by the action of the said cord A, and weight D, without producing any effect, except to turn all parts backwards, to bring them to a proper position to commence their action at the next time of running in the carriage. At the commencement of a new set of cops, and whilst the cones of those cops are forming, the front end of the rule v, requires to be moved at every few successive stretches away from the mule head, or towards the left hand, in order to give it more obliquity as the cops increase, and gradually require a more conical form. That regulation of the obliquity of the ruler v, may be made by the attendant to the machine, who can give the ruler v, a little more obliquity at discretion, whenever he observes the threads begin to wind too slack around the cops whilst the carriage is running in, for then, by moving the front end of the rule v, a little further towards the left hand, the threads will be wound tighter at the next stretch. At the commencement of the formation of a set of cops, the rule v, will be required to be thus moved by hand at every succeeding stretch; and also to be moved a considerable space at each stretch; but as the cops advance, and form sensible cones about the spindles, the rule v, will require to be moved less and less at each succeeding stretch, so that after a few stretches have been made, it will not require to be moved any sensible quantity at each stretch, but moving it a very little once in every two stretches will be sufficient, then once in every three stretches, and afterwards once in every four stretches, and so a less and less frequent regulation will be necessary as the cops go on increasing. This discretionary adjustment of the obliquity of the rule, according to the apparent slackness of the threads as they wind up when the carriage runs in, is so very easy to be done by the hand of the attendant, that it is not necessary to apply further machinery to move the rule v. The backward end of the rule v, is supported on a fixed centre pin x, fig. 2, and the other end rests on a fixed arch Y, which has serrated teeth, and the rule v, has two clicks to act therein, and retain the rule from returning or moving back towards the right hand, by the stress which the roller W, exerts against the edge of the rule whilst the carriage is coming out. When the full cones of the cops are completed, the rule V, will not require to be moved again, or only a very little, during all the completion of the set of cops.

In case it may be thought advisable to have machinery for moving the end of the rule V, whenever it requires moving, the parts with the letters K to R, inclusive, in fig. 2, may be added to those already described. A pin K, is fixed to the end of the rule V, and projects downwards therefrom; one end of the link L, is jointed on to the pin K, and the other end is jointed to the extremity of a straight slider X, which is fitted into sockets affixed to the railway T, whereon the barrel wheel runs, so as to be capable of sliding freely endways in those sockets. The under side of the bar X, has serrated teeth cut in it, to receive the action of the driver N, which is jointed to a short lever M, which is poised on a centre pin, supported by the railway O, and has a heavy tail, which always tends to draw the driver N, backwards along the sloping sides of the teeth, until the farthest retreat of that driver is stopped by the heavy end coming to rest on the floor. The end of the lever M, stands up, so as to be caught by the end of a small elbow lever or dettent P, which is applied to the carriage (and is moveable on a centre pin), whenever the carriage is coming out, but when the carriage is going in, the lever M, is not disturbed. When the elbow lever P, is lifted up, so that it passes over the upper end of the lever M, without touching the same, the said machinery remains entirely out of action. The upright arm of the elbow lever P, is detained by a catch 2, whenever the dettent is intended to be kept out of action; R, is an upright slider, the lower end of which rests upon the tail of this catch 2, and is heavy enough to lift up the other end of that catch, so that it will leave the upright arm of the dettent part at liberty, whereupon its other arm will hang down, so as to intercept and move the other end of the lever M, every time the carriage comes out, but will pass over the ends of the lever M, when the carriage goes in; the consequence is, that the sliding rack X, is moved endways a tooth or two teeth a time, and by its oblique link L, the end of the ruler V, is moved along its arch Y, as is required, and with a more rapid motion at the earlier stretches than afterwards. The upper end of the slider R, is suspended from the wire of the counter faller wire; consequently, when the threads wind slack, from want of sufficient turning motion of the spindle, to gather up the threads as fast as the carriage runs in, the counter faller rises and lifts the slider R, from off the tail of the catch 2, and then that tail being heavier than the other end, will detain the elbow lever P, so as to keep it up out of the way of the top of the lever M, and then no motion will be given to this machinery until the threads begin to wind too tight; the counter faller will then be depressed, and by letting down the slider R, the weight thereof coming to rest on the tail of the catch 2, and overbalancing the same, will let the elbow lever loose, so as to give action to the machinery, as before explained.

Note.—I do not claim the said combination of machinery for moving the rule V, and which is marked in the drawings with the letters from K to R, as one of my improvements.

Note.—I do not claim the rule V, and slider T, by themselves, as my invention, or as part of my present improvements, unless the same are used in combination with the fusee 34, 32, and winding up barrel 26.

Note.—Instead of the cord 35, a chain may be used to pass round the sheave 36, and wind round the barrel part 34 of the fusee, which barrel is not necessary to be a cylinder, but it may be a spiral groove, similar to the upper spiral groove 32. The cord or chain 35 must be fastened to the small or inner end of the lowest spiral curve nearest the centre thereof; the curvation of the upper spiral must be on the contrary direction to that of the lower, if the two fusees join base to base like a barrel. The spiral curvature must be less rapid, and more nearly to a circular figure, when two curves are used, than when one is a cylindrical barrel, and the other a spiral curve, as represented in fig. 2, because the action of the two, when combined, must only produce the same effect in letting out the cords 31, as before described; or a broad strap may be used in lieu of the cord 34, to pass round the sheave 36, and to wrap round the barrel part 34 of the fusee, which must then be cylindrical, but the end of the strap being nailed to the barrel, the strap will coil up around itself, so as to leave somewhat of the effect of a spiral curve below as well as above; or a short chain may be used to go round the sheave 36, the end of that chain being joined to a strong strap, which coils as last mentioned, round the barrel 34; wrapping upon its own coil.

Note.—The roller W, of the slider T, should, when the carriage is quite in, apply to the edge of the rule V, opposite to the fixed centre pin X, which is capable of being set nearer towards, or further back, being mounted in an overhanging forked bracket Z, which is fastened with a screw and a long slit to the railway X, on which the carriage wheel runs.

Note.—And in order that the threads may be caused to wind neatly round the spindles near to the vertices of the cops, a short rule 40, is jointed to the edge of the rule v, to fill up a notch which is cut out in the edge of the rule v, so that the edge of the rule 40 will line exactly with that edge; the jointed rule 40 is pulled out by a spring 41, which is extended from a bracket 42, affixed to the end of the rule v, with a setting screw 43, to strain the spring 41 to any required degree, so as to tend to pull the jointed lever 40 out about its joint to make an angle with the edge of the rule v, in which case, by acting on the roller w, of the slider T, the said spring will pull that slider so much further than the edge of the rule v, would move it as to cause the threads to wind tight about the noses, or vertices of the cops, by setting the screw 43; the spring 41 may be strained till it will produce that effect. After the explanation which has been given of the action of the faller in describing the backing off motion, it is not necessary to enter into further description of the action of the parts.

The faller guide K, is let down gradually as the cops increase in size, by means of a double inclined plane H, composed of two wedges F, fixed on a bar G, which is caused to slide endways by a screw K, of 7½ threads per inch, which screw has a ratchet wheel L, of 25 teeth fixed on the end of it, whereby it is turned round two of those teeth at a time, at every successive stretch. The parts being represented of a larger size at fig. 4, will serve to construct the work by, and need no further description. The faller guide is represented as broken off.

When the above described is required to spin different numbers of yarn, or to put in a different quantity of twist thereto, the alterations in the parts of the common mule are to be made in the usual manner, taking care that the alterations do not affect the proportion which exists between the number of turns made by the axis of the twist pulley and by the spindles. The ratchet wheel L, of the screw K, which gives motion to the shaper F, must be changed for other similar ratchet wheels with different numbers of teeth, by means of which the screw K, will be turned more or less quickly round, in order that it may move the shaper F, and let down the faller guide K, at such a rate of progress as will suit the increased or diminished rapidity of the growth of the cops, by the accumulation of finer or coarser yarn around them.

Note.—The mule above described, when in regular working order, performs a stretch in 23 seconds of time, whereof 16 seconds of time is expended in the carriage coming out, and in giving twist to the threads, during which time the rim or great wheel makes 55 revolutions, and the spindles make 962 revolutions, which in 60 inches length of yarn, is at the rate of 16 twists in an inch of length of yarn, No. 36 for weft. The backing off occupies three seconds, including the stopping, the motion and the running in of the carriage four seconds; this was observed at about the 50th stretch, but after 350 stretches have been made, each stretch is performed in about 22 seconds, because the backing off then takes one second less time.

Note.—Although I have selected by way of example for the previous description, a mule for spinning fine cops for weft, my improvements are equally applicable to mules for spinning twist on larger cops, and also to mules for spinning finer numbers of yarn than above stated; and also my said improvements are equally applicable to those mules which have drums in their carriages for turning the spindles, or to those mules which have long horizontal cylinders in their carriages to turn the spindles; I have rendered mules of both these descriptions self-acting by the application of my improvements thereto, and with equal success.

The proportions and dimensions of the parts of the winding up motion hereinbefore stated were originally set out in order to apply to mules with long horizontal cylinders in the carriages, and were made to act correctly in mules of that description, in which mules the spindles make about from 17 to 20 turns of the spindles to one turn of the rim or great wheel, and about seven or eight turns of the spindles to one turn of the twist pulley, and the spindles make from 10 to 13 turns during the running in of the carriage, if the twist pulley is held motionless. When I have applied self-acting machinery, made by casting the parts from the same pattern, so as to be the same in dimensions and proportions as are hereinbefore stated; to mules with drums in the carriages I have applied a pair of bevel wheels in the carriage, to transmit the motion from the end pulley F, to the drums in the carriage, that pulley being placed nearly in the same position as if the mule had a long cylinder.

The small bevel wheel on the horizontal axis of the end pulley F, has 24 teeth, and it turns a bevel wheel of 45 teeth on an axis, which is placed in an inclined position, parallel to the bevel of the spindles and of the drums, and which axis has a pulley upon the upper end of it to turn the drums by a drum band. The said bevel wheels are in no way necessary to be introduced into the carriage of a mule with the drums, in order to apply my improvements thereto, but having introduced them into those mules with drums in the carriage, which I have rendered self-acting by aid of my improvements, in order to save the trouble of making other alterations in the speeds, I have thought it better to represent the mule in the drawings as it really is working, although the use of bevel wheels in the carriage is not to be recommended. Any mule may be rendered conformable to the proportion and dimensions stated at the commencement of the specification, and then the self-acting machinery hereinbefore described will apply correctly thereto.

For the kind of mules commonly called box organ mules, the usual machinery at the back of the roller beam, whereby that kind of mule is put in motion, should be removed, and a common mule head frame and machinery substituted, something after the fashion of that represented in the drawing, or any other approved pattern for a common mule head, and then the self-acting machinery hereinbefore described will be applicable thereto. There will be no material differences to be made in the self-acting machinery hereinbefore described when the same is applied to mules with the wheels in the middle of the length of the carriage.

A new improvement in the mode of working a pair of mules with self-acting machinery together, by means of which improvement the two mules will be caused to keep proper time one with the other, in the coming out and putting up their carriages respectively, in order that the children, termed piecers, may have time to piece up or mend the ends of the broken threads in one mule before the other mule required their attention for that purpose; and that the carriages of the two mules can never at the same time be in that situation which the piecers usually choose for piecing the broken ends; therefore their attention can never be distracted between the two mules, by both requiring piecing at the same time. In place of the wire before mentioned, which connects the lever z, with the arm of the elbow lever 16, of the backing off motion, a curled wire spring must be substituted, and a small detaining latch must be applied on a centre stud pin, which is fixed in the framing of the mule head, in such a position that it will fall by its own weight in the way of the other lever 16 of the backing off motion, so as to detain and hinder that elbow lever from acting in the manner hereinbefore described, viz. to shift the backing off strap 14 from the loose pulley 15 to the fast pulley 5, notwithstanding that the finger *g*, on the axis *c*, has acted to give motion to the said elbow lever, because the spring which is substituted for the wire to connect the lever z, and the elbow lever together, will yield and extend without moving the elbow lever; therefore the said strap 14 cannot be stripped in the manner hereinbefore described, in order to commence the backing off, unless the said detaining latch is first lifted so as to release the elbow lever 16 from the detention which the said latch occasions, to the action of the elbow lever 16, and, consequently, to the commencement of the breaking off.

The said detaining latch is connected by a wire or small rod with a jointed dettent, moveable about a fixed centre of motion, which is situated in any place near the floor where the carriage of the other mule will pass over the said jointed dettent; and the same is so situate in respect to the coming out of the carriage of that mule, that when the said carriage is come so far out that it becomes inconvenient for the piecers to reach over the carriage, to piece the ends of that mule up, then, but not before, the carriage or some part affixed thereto, will bear down the said jointed dettent about its fixed centre of motion, and pull the wire connected with the aforesaid detaining latch of the first mentioned mule, in the manner of pulling a bell wire, so as to release the elbow lever 16 of that mule from its detaining catch, whereupon, but not before, the coiled spring which is used in place of a wire to connect the lever *z*, with the elbow lever 16, will draw the lever in contracting, and will shift the backing off strap 14, from the loose pulley 15, to the fast pulley 5, whereby it will put the backing mechanism of the first mentioned mule in action, and then that mule will begin to put up.

The improvement being applied to both the mules, which are to work in a pair by self-acting machinery, according to my improvements, will prevent the carriage of the said mule from putting up, until the carriage of the other is got so far out that the piecers will have no further occasion to attend that mule, but by turning round they will find the other mule just put up, and beginning to come out again, and therefore in a proper position for them to piece up the ends.

Note.—The said jointed dettent must give way to the carriages when they strike the jointed parts of the latches in going up again, so as not to pull the wires or links to the detaining latches, when the carriages are going in, but only in coming out.

Having now described the construction and operation of the whole combination of the machinery, which I have used, and which I recommend to be used for rendering mules self-acting according to my improvements, I shall proceed to point out what I claim as my improvements.

First, in respect to the machinery for backing off, I claim as one of my improvements the combination hereinbefore described of those parts which are marked in the drawings, with the numeral characters from 3 to 21, inclusive, which combination so marked performs the office of stopping the motion of the wheel, and of the spindles without needless loss of time, and without violence; and after having stopped the motion, it then turns the spindles round backwards until a proper quantity of the threads are backed off or unwound from the upper parts of the spindles when they rise up above the vertices of the cops.

The essential and new properties of the combination which I do not claim, in respect to backing off as one of my improvements, is that the machinery whereby the backwards motion is to be communicated from the moving frame to the spindles, shall in some part of the train of communications be provided with two distinct means of connecting and disconnecting, the communication of the backward motion, and being for the purpose of commencing the said motion, and the other for the purpose of discontinuing the same; the former being an endless strap or belt to act on a pair of fast and loose pulleys, whereof the fast pulley is so connected with the spindles by intervening machinery, that it must turn round one way, when they turn forwards and the contrary way, when they turn backwards; and the endless strap when prepared for backing off previously to commencing, that operation is on the loose pulley, and moves the same way as the first pulley is to be turned, in order to back off, but the contrary way to that in which the said fast actually does turn by the swing or energy of motion in the moving parts previously to commencing the backing off. The commencement of the backing off is made by shifting the said endless strap from the loose pulley to the fast pulley, whilst the fast pulley is turning round the contrary way to that in which the endless strap moves. By that means the endless strap first assists to stop the motion that the machinery preserves by its swing or energy of motion. After the common driving strap of the mule has been cast off, and the stopping of the remaining forward motion of the machinery being thus performed by the said endless strap and fast pulley without violence, or needless loss of time, they then begin to turn the spindles backwards.

The means of disconnecting the backwards motion so produced must be distinct, as above stated, from the said fast and loose pulleys, by which the backwards motion has been commenced, and the disconnecting should be of the nature of toothed gear, which communicates the motion by the contact of metal teeth, which teeth being withdrawn from their contact, will cease to communicate the motion. The object I have aimed at is that the commencement of backing off shall be begun with an easy and quiet action of shifting an endless strap from a loose to a fast pulley, in order to assist in stopping the previous motion, and then to turn back; but nevertheless, that the cessation of the backing off motion so commenced and produced shall be made by an instantaneous action of what is called throwing teeth work out of gear. But note, in other self-acting mules, the cessation of the backing off has been effected by throwing toothed work out of gear, and I do not claim that by itself as a new improvement, but only the use of fast and loose pulleys, applied under the conditions hereinbefore stated, for commencing the reverse motion without violence as aforesaid; but as an endless strap cannot be thrown off instantaneously, the termination of the motion so commenced should be made by throwing toothed work out of gear, therefore I use two distinct means for connecting and disconnecting as before stated, whereof that for connecting consists of a fast and a loose pulley as aforesaid; and note, I make no claim to that part of the combination of parts hereinbefore described for backing off, which is marked in the drawings with two small letters of the alphabet, viz. from *i*, to *y*, being those parts or combinations of parts which cause the faller wire to be put down with a motion corresponding to the unwinding of the threads during the backing off, in order that the faller wire, with the assistance of the counter-faller wire, may take up the slack of the threads, and keep them to a proper tension.

A very similar combination of parts is in use in other self-acting mules. In respect to machinery for running in the carriage, I make no claim whatever. Secondly, in respect to machinery for winding up the threads, I claim as one of my improvements, the combination of all those parts which are marked in the drawings with numeral characters from 24 to 38 inclusively, which combination so marked performs the office of turning the spindles round during the running in of the carriage, in order that the spindles may wind up the threads in spiral coils around the cops. The said turning round of the spindles during the running in of the carriage being performed with an accelerating motion, that is, with a continually increasing rapidity of angular or turning motion during the running in of the carriage, the rate of that acceleration or rate of increase in rapidity during such running in of the carriage being suitably adopted to the diminishing length of thread, that is, wound up by each of the successive coils which the threads must make around the conical cops, as those cops ascend spirally from the bases of the cones towards the vertices thereof, and hence the said rate of acceleration or of increase in rapidity will be least at first when a new set of cops are begun on the spindles, and will become greater as the cops increase, and become more and more conical until the full one of those cops is completed; and further, the said combination causes the spindles to make a small number of turns during the running in of the carriage at every succeeding or at every few succeeding stretches or times of winding on a layer of threads around the cops from the commencement of a new set of cops, until the full cones of those cops are completed; and note, I do not claim the part included in that combination which are marked in the drawings by the capital letters of reference from T to Y inclusivey; because a rule, similar in its form and its properties to that which I use, and which is marked V, in the drawings, together with a slider T, to be moved by—that ruler was invented some years ago by Mr. De Jongh, and is fully described by him in the specification belonging to a patent, which was granted to him, dated the 18th day of December, 1826, viz. a straight rule, to be placed horizontally beneath the carriage of the mule, with the length thereof in the direction of the rim of the carriage, but capable of being placed more or less obliquely to that direction at pleasure, in order that the edge of the said rule may act in the manner of an inclined plane upon a roller or rollers, borne by a slider, which is fitted to slide horizontally in a groove fixed beneath the carriage, in the direction of the length of the carriage.

To such a rule and slider I make no claim; but the essential and new properties of what I do claim, in respect to winding up, as one of my improvements, is the means of communication of motion, hereinbefore described, and marked in the drawing Fig. 1. with the numeral characters 31 to 38 inclusive, whereby the motion of the said slider T, in its groove during the running in of the carriage, is caused to diminish or augment in a greater or lesser degree; and also with a rate of acceleration corresponding to that degree, all that turning motion which the spindles derive from the running in of the carriage, partly by the ordinary action of the drum band and end pulley E, and still more from the action of drawing off the cord 31 from off the winding up barrel 26.

In order that the turning motion which results from the action of the combination, when diminished or augmented by my means may have an accelerated motion during the running in of the carriage, which accelerated turning motion will be suitable for winding the threads around conical cops, that is to say, when the slider T, (which I do not claim,) is caused by my means 31 to 38 aforesaid, to deduct or add very little from or to the said turning motion of the spindles, then but little variation will be made in the acceleration of the turning motion, which results as aforesaid, but the more the said slider is caused by my said means to so, deduct from or add to, the more the resulting motion will have the quality of acceleration given to it; because by means of the spiral curve 32, of the groove of the fusee, all the motion which that fusee transmits in augmentation or diminution of the turning motion which is given by the action of the end pulley, and of the winding up barrel 26, is accelerated motion, and gives the quality of acceleration to the resulting motion in a greater or lesser degree, corresponding to the actual quality of the turning motion which results; for instance, if the inclined rule V, is set so as to give no motion to the slider T, in its groove, then no augmentation or diminution will be given to the turning motion, nor will their turning motion have any acceleration given to it. But if the rule is set at a considerable obliquity to the motion of the carriage, as in Fig 1, so as to give a considerable motion to the slider T, in its groove, then the turning motion which is by my said means, transmitted therefrom to the spindles being in diminution of the turning motion, will cause the resulting motion to be but few turns of the spindles, but they will turn with a rapid rate of acceleration during the run in of the carriage. What I above called my means of communication of motion, for the slider T, in its groove to cause diminution or augmentation of the turning motion of the spindles, viz. the combination marked in the drawings 31 to 38, inclusive, and whereof the spiral groove of the fusee is the principal member, has the property of producing accelerated turning motion of the spindles from uniform rectilinear motion of the slider T, in its groove under the carriage, which will be illustrated by a simple experiment, viz. suppose the carriage to stand still and be out, and the winding up barrel 36, to be in order by its wheel 25, and pinion 24, in that case, if the end of the rule V, is moved along its arch Y, from one end to the other, that motion of the ruler will cause the spindles to turn round, and also they will turn quicker and quicker as the ruler becomes more and more oblique; whereas, if the same experiment were made upon the machinery of Mr. De Jongh's specification aforesaid, no motion whatever would be given to the spindles, but they would stand still.

Note.—A winding up barrel and cord with wheel and pinion, together with a reverse cord and counterweight similar to that which I use, and which are marked 26, 31, 25, 24, and also A, unto D, in the drawings, has been used before in self-acting mules, in order to give a turning motion to the spindles by pulling a cord 31 off therefrom by the motion wherewith the carriage runs in. I make no claim to the parts 26, 31, 25, and 24, also A, to B, except when the same are used in the combination of the parts marked 24 to 38, which I have claimed as aforesaid, and of which combination, the new and essential properties have been set forth above. Lastly, I claim as one of my improvements, the detaining latch and parts hereinbefore described, for compelling a pair of mules which are to work by self-acting machinery, according to my improvements to keep, proper time, one with another, to suit the convenience of the piecers hereinbefore set forth.—[*Inrolled in the Petty Bag Office, November,* 1831.

Specification drawn by Mr. Farey.

[In the commencement of our report on Knowles's specification, we observed that the subject was about to be submitted to legal investigation. An injunction has been obtained in the Court of Chancery, by Messrs. Sharp and Roberts, of Manchester, prohibiting Mr. Knowles from exercising his invention of a self-spinning mule, on the plea of his having infringed upon the patent right of Mr. Roberts, granted to him 29th March, 1825, (for specification of which, see Vol. XIII. page 6, of the First Series of our Journal). On a motion to dissolve the injunction, after several days argument before the Lord Chancellor, his Lordship delivered the following judgment]:

COURT OF CHANCERY,

Lincoln's-Inn Hall, 21st *July,* 1832.

ROBERTS *v.* KNOWLES.

Observations by the Court, &c. at the conclusion of the arguments at the Bar.

Brougham, C.—Now, I want to know this,—for you Sir Edward Sugden are for the plaintiff—I want to know what difficulty there would be;—this is now Saturday the 21st,—this day three weeks will be commission day at Lancaster, and the assizes there last a fortnight, so that there is at least a month, a clear month, between this and the timeat which it might come on for trial here;—I want to know, [suppose I was to continue the injunction, which of course it is to be understood I mean to do on terms;] what difficulty there would be in trying this at Lancaster in the last week of the assizes? You see a great bulk of your witnesses are to be found in the county palantine, the others are engineers in London.

Sir E. B. Sugden.—My Lord, we have no difficulty, I understand, about it.

Brougham, C.—Well then, how are you on the other side?

Mr. Solicitor General.—My Lord—

Brougham, C.—How do you feel as to that—for there has been a great delay on your part, between the granting of the injunction, four months; no doubt the affidavits, and particularly Mr. Farey's affidavit, would take a considerable time in being prepared; but four months, at least, from the granting the injunction, till the time you applied to have it dissolved.

Mr. Solicitor General.—Why, my Lord, as your Lordship knows very well, it was thought right to have, in a case of this sort, affidavits of the most eminent persons in the department of life to which they belong, and there is always a difficulty and delay in procuring their evidence.

Brougham, C.—No doubt; but what difficulty would there have been at trying this at these assizes.

Sir E. B. Sugden.—We are quite ready.

Brougham, C.—Two courses;—suppose I should continue the injunction about which I have still some doubt—two courses there are, one of which may be taken; the one is, to have it tried in the Court of Exchequer, or in the Court of Common Pleas, after next term. I would take one of those Courts, if it were to be tried here; the other would be to have it tried at Lancaster, which would be still better, as it is very desirable to have it tried as soon as possible.

Mr. Solicitor General.—I am sure, my Lord, I am not able, at this moment, to say how far my clients would be able to get ready.

Brougham, C.—In any event, I shall look into it, on the ground I am now going to mention, and state, at the sitting of the Court, on Tuesday morning, what I think of it.

Mr. Solicitor General.—Mr. Farey states to me that he will be so occupied—he will have to be at Cornwall and some other places, so that he does not think he will be able to be there but with great difficulty.

Brougham, C.—The learned Judge would accommodate the parties with respect to witnesses. The trial might be put off from next Monday four weeks to next Friday four weeks probably, and that might be in time for it to be tried.

Mr. **Solicitor General**.—Perhaps your Lordship will allow us to have till Tuesday morning, to consider of it upon that point only?

Brougham, C.—Yes, certainly. Well then, upon the whole matter, it is impossible for me to say that if I had seen the whole evidence now produced on the other side, that if it had been before me at the time the injunction was applied for, I should have granted the injunction;—I do not say I am clear upon it. It is also clear that if upon an early application to dissolve the injunction I had seen these affidavits, the probability is I should have dissolved it, and have left the parties to proceed at law; but when I take into my consideration the delay of four months, that certainly very much influences my mind; nevertheless, I shall look into the whole of the matter between this and next Tuesday morning, when I shall say whether I shall continue the injunction or not; if I do continue it, it will be upon the terms of the plaintiff's proceeding at law immediately.

Mr. **Solicitor General**.—We shall probably be able to ascertain between this and then what we shall be able to do.

Brougham, C.—I have referred more than once to Mr. Farey's affidavit—it is a very important affidavit; nevertheless, I must say Mr. Roberts's invention is a very ingenious invention, a very original one, and it is not upon the specification I have my doubt, it is chiefly upon the identity of the operation with that of the defendant's that I have my doubt; but I shall look into that again. I look upon the delay to have been very material in this case.

Mr. **Solicitor** General.—It has been very unfortunate for us, certainly.

Brougham, C.—The impression, the present impression on my mind is, that I shall be disposed to continue the injunction upon the somewhat strict terms of putting it upon the plaintiff immediately to proceed at law. I shall mention it at the sitting of the Court on Tuesday morning, that there may be no loss of time. Let me have the specification and the affidavits.

Sir E. B. Sugden.—We ought not to lose a moment.

Brougham, C.—When I say the identity of the operation in that case of Roberts and Knowles, I wish not to be misunderstood; it is particularly that part of it that I allude to in which the fusee and the diagonal bar come in the place of the radial arm of the other.

Sir E. B. Sugden.—Yes, my Lord, but we do not; I am sure your Lordship understands that we do not dispute that part with them.

Brougham, C.—Oh, I am quite aware of that, but the question is, whether the giving of the variable motion, that being the gist of the thing, in that way be the same? It is upon that that I wish to look at the specification and the affidavits. You do not go against them for the diagonal bar, I know.

Sir E. B. Sugden.—Certainly not; we admit they have a mode of adjusting the rotatory motion different from ours, and we do not find fault with that, but we object to their taking the means.

Brougham, C.—Which, in short, you say are the same as yours.

Sir E. B. Sugden.—Exactly; I may ask whether your Lordship would like to have the models.

Brougham, C.—No; I think I have the models so completely in my mind, that if I have the specification and the plans annexed to it, and the affidavits, I shall do. You see if I were to take the models, I must have one professional gentleman on each side to attend me, and that is very inconvenient in the absence of counsel—it is much better not.

Sir E. B. Sugden.—Yes, probably it is.

Brougham, C.—I must have the affidavits to-day before the rising of the Court, because I shall read them this evening.

Court of Chancery, Lincoln's Inn Hall, 21*st July,* 1832.

ROBERTS *v.* KNOWLES.

JUDGMENT.

Brougham, C.—Now,—are the parties here in Roberts and Knowles?

Mr. Oates.—They are not come yet on our side, my Lord.

Brougham, C.—They ought to have been here.

Mr. Oates.—They are gone for.

Brougham, C.—But they ought to have been here by this time, it stands first in the paper;—well, we must mention it when the learned counsel come into court. Oh, here is one of them. Mr. Duckworth is coming.

Mr. Cooper.—Mr. Duckworth on the other side is now here, my Lord.

Brougham, C.—Yes, I see he is; and Mr. Solicitor General is also just coming up the Hall.

Now, Mr. Solicitor General, in this case of Roberts and Knowles, a further consideration of the patents for the two processes of making the machines, and of the whole matter, has considerably lessened the doubt that I had, and which I expressed when I was last here at the latter part of the arguments; nevertheless, it still appears to me to be a case quite fit to be tried, and it seems to me to be quite as possible to try it at these assizes.

When I say, considerably lessened the doubt that I had, what I mean is, that it has mended my opinion of Mr. Roberts's case on the latter point as to the identity. However, it is perfectly fit that I should not enter further into the case just now, because it is agreed on all hands it should be tried, and the question simply is, how soon it can be tried?

Now, I was disposed to say on Saturday that it ought be tried, —and the plaintiff has no objection to that,—that it ought to be tried at these assizes for the county of Lancaster. It certainly is very desirable that it should be tried as speedily as possible; nevertheless, I incline to lay him under the terms to continue the injunction, and to lay the plaintiff under the terms of proceeding to try it at these assizes for the county of Lancaster; unless within a week from this date the defendants shall give notice that they prefer not having it tried at these assizes; because, from what has passed, it has occurred to me that they may be better prepared than you are, Mr. Solicitor General; indeed, they are perfectly ready, and from what I know of the business there, there might be abundance of time for you to get ready, for I think it might be tried this day four weeks, or to-morrow four weeks, and therefore there might be abundance of time for you to be ready; nevertheless, it is possible there might not, therefore you must give them notice within a week whether you will prefer to go to trial then or not, and that will be sufficient, Sir Edward Sugden?

Sir E. B. Sugden.—Yes, my Lord.

Mr. Solicitor General.—Why, my Lord, nowithstanding the great inconvenience that will result to us from being tied up by the injunction, should we not proceed to trial immediately, yet I think, considering the difficulty there will be in getting prepared for trial for these assizes, the better way will probably be to have it tried in London.

Brougham, C.—Then I was just going to make the observation, that as a great many of your witnesses, and almost all your skilful men live in London, it might be as well that you should try it here, and then the only question is as to the state of the paper in the common law courts. If the action was brought in the Court of King's Bench, probably it might be twelve months before you could try it, therefore, to have it tried here, I would lay them under terms not to try it in the Court of King's Bench, but to try it in the Court of Common Pleas, or in the Court of Exchequer.

Mr. Knight.—In the Court of Exchequer, if your Lordship pleases.

Brougham, C.—Very well.

Sir E. B. Sugden.—No, no; I do not know why we are to be bound to go into any one particular court. You cannot compel me to consent just to go into the Court of Exchequer, and no where else.

Brougham, C.—Very well, we will say either the Court of Exchequer, or the Court of Common Pleas. I believe that either will give you about equal priority in point of date. In Middlesex, you know—in Middlesex, Sir Edward Sugden?

Sir E. B. Sugden.—Yes, if your Lordship pleases.

Brougham, C.—Because it saves time to go there.

Mr. Solicitor General.—And then, my Lord, if it should be necessary, the court will do what it frequently has done in cases of this sort—give directions for the necessary parties to be at liberty to inspect the machines, though I do not think that will be found to be necessary.

Brougham, C.—Oh, yes; but I do not think there will be the least difficulty of accession on either side.

Sir E. B. Sugden.—None.

Mr. Solicitor General.—No, no, I dare say not. The parties are all dealing fairly.

Brougham, C.—When I said, that a little further consideration of the case by myself had somewhat improved my opinion of the plaintiff's case, and left my opinion as to the identity less doubtful, I ought to have stated, that nothing could have been more able than the arguments of the learned counsel for the plaintiff; but sometimes having a little time to look into details, enables one to pick up things which they do not always lay hold of from the bar, and so it was here.

To ROBERT WILLIAM SIEVIER, *of Southampton-row, in the parish of St. George, Bloomsbury, in the county of Middlesex, gentleman, for his having invented or discovered certain improvements in the making or manufacturing of cables, ropes, whale fishing and other lines; lathe and rigging bands; bags and purses; parts of which said improved articles are applicable to other useful purposes.*—[Sealed 1st December, 1831.]

THIS invention consists in the application or employment of filaments, threads, or strands of caoutchouc or India rubber, to or for the making, manufacturing, or constructing of elastic cables, ropes, whale fishing and other lines, lathe and rigger bands, bags and purses; such filaments, threads, or strands of caoutchouc or India rubber, being previously platted over or covered with hemp, flax, silk, wool, cotton, catgut, Indian grass, strips of leather, or other fit and proper materials, part of which articles, when so manufactured, are applicable to various other useful purposes.

As filaments or threads of India rubber, covered with cotton, silk, and other materials, are now commonly used in the manufacture of many articles where elasticity is required, and as such filaments or threads are covered with the different materials by various kinds of machines applicable to the purpose, it is not necessary for me to describe any particular machinery by which the filaments, threads, or strands of India rubber, required for the different articles to be manufactured in my improved manner are to be platted over, intermixed, or covered with the materials. I therefore shall only state generally, that the filaments, threads, or strands of caoutchouc, are prepared by cutting them from any convenient sized or shaped piece of India rubber into long strips, which are afterwards stretched to their utmost tension, and wound upon drums, reels, or bobbins, ready to be platted over or covered by, or interwoven with, the various materials before mentioned.

This may be done by any proper machinery, such as those used for making sash lines, braiding, platting, or stay lace machines, or any other machinery of the like description, which will cover the filaments, threads, or strands, with the different materials in the manner of winding, platting, netting, knitting, laying, or interweaving, or any such other kind of fabric or manufacture, which will allow of the filaments, threads, or strands, when so covered, stretching, or collapsing in their length to the degree of elasticity required, without injuring their tenacity.

The filaments, threads, or strands, after being prepared by platting over, covering, or intermixing them with any of the different materials, as above described, either singly or mixed, are for the manufacture of any of the various articles above mentioned to be platted, netted, knitted, laid, or interwoven one with the other, by any kind of machinery applicable to the purpose, or they may be used in the same manner, without covering them with any coating of the different materials.

The number of filaments, strands, or threads to be so combined, and the positions of them, depending upon the different kinds of article to be manufactured. For instance, in the manufacture of cables, ropes, or other articles where great strength and elasticity is required, the filaments may be passed through different machines, each machine taking the strand or cord of filaments, as prepared by the foregoing machine, and platting, netting, knitting, laying, interweaving, or otherwise combining any number of such strands or cords again into one strand or cord, and so on, until the article is composed of such a number of filaments, threads, or strands, as are necessary for its required strength

In order that my improved manufacture of the various articles above mentioned may be better understood, I shall proceed to describe the principle of constructing the same, that is, of the methods or manners in which the single filaments are combined, by laying, interweaving, knitting, or netting, so as to form the completed article, and I have hereunto annexed several diagrams, which will serve to illustrate the same: reference being had to the figures and letters marked thereon; that is to say,

Having prepared any number of the filaments or threads of the caoutchouc or India rubber, they are severally to be coated or covered with any of the above named, or other proper materials, by means of winding, platting, braiding, knitting or netting machines, or any other machinery which will cover them with the different materials, in such a way as to allow of their stretching or collapsing in their length.

Plate IX. fig. 1, may be considered as an end view or section of one of these filaments or threads, as it would appear when cut asunder; seven, or any other number that may be thought desirable of these filaments, are then taken and placed, as in fig. 2, and in the side view fig. 3, and are covered with a coating of any of the proper materials, by means of a platting, knitting, netting, winding, laying, or other machines, thus forming a strand or cord, which may be used as a sash line, whale fishing, or other lines, lathe, or rigger bands, according to the size of the filaments used. These strands or cords of filaments, are also capable of being formed with others of a similar description into a cable rope, band, or line, in various ways, either by placing them together in straight lines, and covering them with a coating of the various materials, knitted, netted, or platted, or wound upon them; or instead of being placed straight against each other, they may be platted, knitted, or netted, laced or interwoven one with the other, as figs. 6 and 7, or so connected together as to render an external casing or coating unnecessary.

Fig. 4, shews seven of the strands or cords of filaments, as formed in figs. 2 and 3, which may be connected together by a coating of single filaments, or they may be covered by strands or cords of a greater number of filaments, or of cords or strands of the different materials above mentioned, or any other description of coating which will allow of the free action of the elasticity of the India rubber. The interstices between the strands must be filled up with any suitable sized filaments or strands, prepared as above. There may be seven of the strands or cords, as last described, connected in like manner, so as to constitute a large rope or cable; fig. 5, is a section of a rope or cord, composed wholly of filaments, as at fig. 1, without being combined, as above described, which may be covered, as above stated.

My improved bags and purses are composed of knitting or net work, made of strands or cords of the filaments prepared, as above described, and which is capable of being made into purses or bags by hand; or the filaments, strands, or cords, prepared as above described, may be knitted, netted, or platted into purses or bags, by machinery or by hand. As there are so many descriptions of bags to which these improvements in the construction may be applicable, it is not necessary to state further, than that in any case where elasticity may be required, the bag or purse may be made wholly of the above materials, or only parts used; for instance, in making carpet travelling bags, I should only form the ends or edges of the bag of the elastic material, covered, when stretched to its utmost extension, with leather, or other suitable substance, which will be capable, on collapsing, of drawing up the leather, or other covering, into puckers or gathers, so as to allow of the bag enlarging very considerably, when any extra quantity of articles are put into it.

Having thus described the process, and the kind of machinery which may be used for platting over, covering, or intermixing, the filaments, threads, or strands of caoucthouc or India rubber, with hemp, flax, silk, wool, cotton, catgut, Indian grass, strips of leather, or any other fit and proper material; and also some of the modes or methods of combining such filaments, covered as above described, for the constructing or manufacturing of cables, ropes, whale fishing, and other lines, lathe, and rigger bands, bags or purses, I desire it to be particularly understood, that I do not wish or intend to claim as my invention, any part of such machinery used for so platting over, covering, or intermixing the said filaments, threads, or strands of Indian rubber, as it is well known and in common use; and as any kind or construction of machinery capable of covering them, by knitting, netting, platting, or intermixing, will answer the purpose desired. Neither do I intend to claim the machinery, or confine myself to the manner or mode of combining such filaments, threads, or strands of Indian rubber, to produce the articles above mentioned, as I am aware there are many other ways of manufacturing cables, ropes, whale fishing and other lines, lathe, rigger bands, bags and purses, from filaments of caoutchouc, prepared as above described. But I wish it to be understood, that I do claim as my invention, the application of filaments, threads, or strands of India rubber, in the making or manufacturing of cables, ropes, whale fishing and other lines, lathe and rigger bands, bags and purses, in the manner herein particularly described.—[*Inrolled in the Rolls Chapel Office, June,* 1832.]

Specification drawn by Messrs. Newton and Berry.

To Robert Stephenson, *of Newcastle-upon-Tyne, Northumberland, engineer, for his having invented an improvement in axle and parts which form the bearings at the centres of the wheels for carriages which are to travel upon edge railways.* [Sealed January, 1831.]

These improvements in the axles and parts which form the bearings at the centres of the wheels for carriages, which are to travel upon edge railways, consist in fixing two ofth said carriage wheels fast upon the extreme ends of a long hollow, or tubular axis, within which a solid central axis is inserted, extending through all the length of the hollow—and projecting out sufficiently beyond the end of the hollow axis, to enable the weight of the carriage to be supported upon the projecting ends of the solid central axes, around which the hollow axis turns, together with the two wheels, which are both fastened upon the ends of the hollow axes.

In the carriages now used upon the Manchester and Liverpool railway, each pair of wheels are fixed fast on the two opposite ends of a long solid axis, which revolves with the wheels, and the two extremities of the solid axis, which project out through the centres of the wheels, are formed into pivots, or gudgeons, and are received in suitable sockets, wherein the weight of the carriage is borne by the hollows or concavities of those sockets pressing downward on the pivots.

In travelling with great rapidity, the said pivots require a copious supply of oil, much of which is wasted, because the hollows or concavities of the sockets (which do not revolve) are inverted, in order that they may bear downwards upon the upper parts of the circumferences of the revolving pivots of the axis, consequently the oil has a tendency to run down and escape from the places of bearing where it is wanted. According to my improvements it is the central axis, which does not revolve, and it is the lower parts of the circumference thereof which apply and bear downwards within the hollows, or concavities of the hollow, which does revolve around that central axis, consequently the oil has a tendency to run down into the places of bearing where it is wanted, the action thereof being (in that respect) the same as in the axles and boxes of common coach wheels, wherein the axle does not turn round, but the box in the centre of the wheel turns round about the axle.

For travelling on edge railways, the wheels on the opposite side of the carriage require to be firmly united, so that they will turn round together in pairs, in order to prevent one wheel from advancing either faster or slower along one rail than the other wheel advances along the other rail. On the common plan of coach axles and boxes, the wheels of each pair being quite independant one of another, one wheel can turn round without the other wheel, and hence such axles and boxes are unsuitable for the wheels of carriages which are to travel upon edge railways, and hence the mode above stated has been introduced, *videlicit*, that of fixing each pair of wheels upon a solid axis, which turns round with them and compel them both to go together, according to my improvement of fixing the two wheels upon the extreme ends of a long hollow, or tubular axis as aforesaid; the pair of wheels are firmly united together, so that one wheel cannot advance more along one edge rail than the other wheel does along the other rail, and that circumstance (which is an important condition for travelling with safety and rapidity on edge railways), is combined with the advantage of the ordinary coach wheel axles in respect to their supply of oil, viz. that the bearing of the solid axis, which does not turn round presses downward into the hollows, or concavities of the hollow sockets, which turn round with the wheels, giving the oil a tendency to insinuate itself between the bearing surfaces.

In Plate IX, is represented so much of a carriage, which is to travel upon an edge railway, as is necessary to explain my improvements. Fig. 8, is a lateral elevation of a four-wheeled carriage, suitable for conveying goods on an edge railway, showing the two wheels *a*, *b*, which follow each other along the same rail *d*, of the railway. Fig. 9, is a transverse section answering to the former figure, and shewing one of the pairs of wheels *a*, *b*, which are at the opposite sides of the carriage, one running on one rail *d*, and the other rail *e*.

The pair of wheels must be united together as before mentioned, and that is done by means of the long hollow, or tubular axis 1, the two ends of which are inserted and firmly fastened into the central holes of the two wheels *a*, *c*, so as to keep them at the proper distance apart, to suit the space between the rails *d*, *e*, and to keep them firmly vertrical when they turn round. One of the wheels *a*, is represented in section, as if it were cut through the centre by a vertical plane to expose the interior parts, and that section is repeated on a larger scale in fig. 11.

To explain the structure of the part s 2, is the central solid axis which passes through the interior of the long, hollow axis 1, but which central axis does not turn round. It is enlarged a little at the parts which form the cylindrical bearings 3, which are contained within each of the ends of the hollow axis 2, where the wheels *a*, *c*, are fixed on the outside thereof. The middle part of the solid axis being rather smaller in diameter than the cylindrical bearing parts 3, 3, a space is left vacant all round the solid axis within the hollow axis, to contain a stock of oil. When that stock requires to be renewed, a supply of fresh oil is poured into the vacant space through two holes at 4, 4, which are then stopped very tight by screw plugs. When the carriage is in use, the oil makes its way from the middle parts of the hollow axis, towards each end thereof, where the bearings are, and thereby the bearing surfaces are kept constantly supplied with oil. The ends of the central axis, which project out beyond the ends of the hollow axis, are also smaller in diameter than the cylindrical bearing parts as shown at fig. 11.

The weight of the carriage is supported upon those projecting ends 5, each of which is for that purpose received in a socket *f*, *f*, made in two halves, screwed together, as shewn in figs. 10, 11, and fig. 12, by four small bolts *z*, *z*, and also by the two staple bolts *y*, *y*, which fastens the springs *g*, down across the upper flat sides of the socket *f*, and the pressure of all those screws binding the two halves of the said socket *f*, firmly together around the end *f*, of the solid axis, fastens the socket to the axis.

The outer end of the socket *f*, is fitted into a vertical groove, formed in the space between the two prongs *x*, *x*, of a forked plate of iron, which is screwed to the horizontal side rail *h*, of the carriage, as shewn in fig. 12, and projects downwards therefrom. The ends of the spring *g*, apply to the underside of the side rails *h*, and bear the weight of the carriage, the middle part of the springs being borne upon the socket *f*, to which they are fastened, as before stated; and when the springs bend (by the jolting motion of the carriage in passing over the joinings of the rails or uneven places) the sockets *f*, rise and fall in their verticle grooves.

To confine the hollow axis with the wheel from having any unnecessary end-play on the solid axis, circular plates or rings of metal, are fastened one against each end of the hollow axis, being bolted fast to the flat surfaces of central bosses or naves 1, of the wheels, and those rings having small circular projections, which enter a little way into the ends of the hollow axis (as shewn at fig. 11) those projections apply to the shoulders, which are formed on the solid axis by the enlargements 3, 3, which form the cylindrical bearings thereof.

The central hole through each of the rings 6, is only just so much larger than the end 5, of the solid axis as to allow of a free turning motion, but the central projection, which enters into the end of the hollow axis, is fitted very tight therein. A large washer of leather is interposed between the flat surface of the ring 6, and the corresponding flat surface of the central boss, or nave 1, of the wheel, and the ring 6, is bound fast thereto by screw bolts 7, 7, which pass through the boss 1, of the wheel, having their heads countersunk into the ring 6, and having nuts screwed on their opposite ends, which project through the boss of the wheel.

The ring 6, of the leather washer prevents any oil getting out, except that which makes its way, and that it may not drip away or run down the arms of the wheel and get to the rails, or be lost, a hollow oil box *w*, *w*, is provided to receive, and save the oil which escapes. The said box is cast in the same two pieces with the socket *f*, before described as being in two halves when they are put together; the oil box *w*,*w*, clasps around the outer end of the nave 1, of the wheel, and the circular rim of the ring 6, projects beyond the flat surface of the nave 1, against which it is fastened by the bolts as aforesaid, and the part so projecting being opposite to the flat face of one of the circular hoops (by which the nave is bound and strengthened) forms a circular groove around the circumference of the nave 1, into which groove a corresponding interior rim of the oil box projects and interclocks in the manner shewn in the section, and without touching at any part; the interlocking prevents the escape of the oil or the entrance of dust into the oil box; but all the oil which makes its way out of the hollow axis will be caught in the oil box, from whence it may be drawn off through a suitable plug hole, or tap cock, at the bottom of the oil box when a quantity has accumulated therein.

The form of the oil box is fully explained by figs. 10 and 11. The solid axis 2, is made of wrought iron, of competent strength to bear the load that the carriage is to convey.

The carriage is represented with wheels, three feet diameter, made of cast iron in one piece, and surrounded with wrought iron tires to run upon the rails; also with wrought iron hoops surrounding the projecting ends of the nave, to prevent splitting. The wrought iron tires and hoops are applied in the usual manner when hot, that they may shrink on the cast iron in cooling, and bind the same very tight; the outside of the tires are turned true, and the central holes through the naves are bored truly cylindrical. The ends of the hollow axis are turned true on the outside to fit tight into the centre holes through the wheels and when inserted they are secured by driving in a key, which is fitted into a hole previously cut in the joint, so that one half of the thickness of the key lodges in the cast iron nave, and the other half in the wrought iron hollow axis. P. The extreme ends of the hollow axis conform with the flat surface of the naves of the wheels, in order that the flat surfaces of the rings 6, with their leather washers, may apply to both.

The hollow axis is made of wrought iron, welded in the manner of gun barrels; an extra thickness is given at each end where it is to be fitted into the wheels. The inside of the hollow is bored out truly cylindrical at each end, where the bearing parts 3, of the solid axis, are to fit into it; those parts are turned truly cylindrical, and may be case hardened, as well as the interior of the hollow axis at the bearing parts, and also the projecting central parts of the rings 6.

Note.—These projecting parts enter so far into the hollow axle as to leave very small vacant spaces between them and the shoulders of the central axis, and to allow about a quarter of an inch end-play to the wheels along the solid axis.

Many of the parts hereinbefore described admit of being differently constructed, without any departure from my invention. Wheels of wood, with cast iron naves, may be substituted for those represented in the drawing. The hollow axis may be made of cast iron of a suitable increase of metal, so given to make up the same strength. The ends where the bearing parts of the solid axis are to fit into the ends of the hollow axis may be lined with brass, or with bell metal, inserted and fixed in. The ends of the solid axis may be fitted into its socket, so as to be at liberty to turn freely round therein, instead of being held fast as before described. The use of that will be, that the axle may turn round with the wheels, in case it has been neglected to give a due supply of oil to the hollow axis before setting out on a journey, and that in consequence the fitting parts thereof become bound together during a journey. A narrow groove may be cut in the cylindrical surface of each of the bearing parts of the solid axis, winding spirally round the same, in order to assist in conveying the oil to all parts of the length of the bearing.

Having now described my said invention, I do hereby declare, that what I claim as my improvement in the axles and parts which form the bearings at the centres of wheels for carriages, which are to travel upon edge railways, is the combination hereinbefore described of those parts which are marked in the drawing with numerical characters for reference in the foregoing description. That combination being made for the purpose of causing the bearings of the solid axis (which does not turn round) to press downwards into the concavities of the hollow axis, which does turn round with the wheels, and which hollow axis connects the two wheels together, so that one cannot turn round without the other; and I make no claim to the said improvement except in its application to carriages which are to travel upon edge railways.—[*Inrolled in the Inrolment Office, July,* 1831.]

To John Milne, *of Shaw, in the parish of Oldham, in the county of Lancaster, cotton spinner, for his invention of improvements on certain instruments or machine, commonly called roving frames, and slubbing frames, used for preparing cotton and wool for spinning.*—[Sealed 13th July, 1331.]

These improvements are stated to consist in shortening the spindles of roving and slubbing machines, in separating the flyers therefrom, and attaching a wheel to each of the flyers, for the purpose of giving them a rotary motion, by gearing distinct from, and independant of, the rotary motion of the spindle and bobbin, the particular objects of which are to produce steadiness in the movements, that is, to prevent the vibration of the spindles, and to afford greater facility to doffing or dismounting the bobbins when full of roving or slubbing.

The contrivance is simple, and is shewn in Plate IX., fig 13, which represents a portion of the front part of a roving or slubbing machine, with two of the bobbins and flyers; *a, a,* are the front drawing rollers, as usual, from which the filaments of cotton or wool pass down, through the central tubes of the flayers *b, b,* and being conducted along one of the hollow arms of the flayer, or by are lower end of the arm guided on to the bobbin *c.*

The bobbins *c, c,* are mounted on short spindles *d,* turning in bearings, and receive their rotary motion by means of bevel gear at *e, e,* from any convenient moving power, which causes them to wind the yarns on to the bobbin.

Rotary motion is given to the flyers, by means of toothed pinions *f, f,* affixed on the flyer tubes at top which pinions are driven by the intermediate, wheel *g,* actuated in any way that may be found convenient, independantly of the bobbins.

By the rotation of the flyer, the filaments of cotton or wool delivered from the drawing rollers, are spun into yarn, and there being a difference between the rotary speed of the flyers and the bobbins, the latter take up or wind on the yarns, which are thereon received in regular coils, by the ordinary movements of the copping rail *h,* which raises and depresses the bobbins, as in other similar machinery.

The ordinary parts of the machinery may be constructed in any of the usual forms or modes of combining the parts; the features claimed as novel being, as above said the described method of shortening the spindles, to prevent vibration, and of giving to the spindles and to the flyers distinct motion, by means of separate gearing, however contrived, in a machine for roving or slubbing, which the Patentee considers to be new.—[*Inrolled in the Inrolment Office, September,* 1831.]

To Samuel Hobday, *of Birmingham, in the county of Warwick, steel snuffer and toy manufacturer, for his having found out or invented a certain improvement* *in machinery to be worked by steam, that may be applied for the moving of ships, boats, and barges, on the water, and to carriages, either on the roads or tramways, and in a fixed position, may be applied to all the purposes that steam engines are now used for.* [Sealed 24th May, 1831.]

The nature of my said invention or improvement consists in the combination of certain parts of or to a machine or apparatus, hereinafter to be described, called a steam wheel or engine, worked by the aid or force of steam, or gas, using the known advantages of the expansive force of steam or gas in conjunction with the condensing apparatus, valves, and other parts and known principles employed in steam or gas engines or steam wheels, without claiming any of the parts individually, but only the general combination thereof, completing by this improvement a machine or apparatus capable of being employed to advantage as a first mover of power to propel machinery, which will reduce or materially lessen friction, and be more compact than the common steam engine.

Plate IX. figs. 18 to 22, represent a wheel or drum of cast iron *a*, supported by any number of arms or spokes from a spindle or shaft *b*, similar to a breast water wheel without the floats or buckets, from which spindle or shaft I propose to work either horizontally or perpendicularly, as the machinery used may require, so as to turn on its necks or centres *c*, *c*, having proper sills and supports under, according to the power of the machine. From the spindle or shaft *b*, or from the wheel or drum *a*, I propose to take the first moving power with cogged wheels or other suitable contrivance, so as to communicate the motion of the drum or wheel to any required machinery.

The outer circumference of the drum or wheel *d*, is turned true and smooth to fit steam tight to the cap or caps *f*, *f*; the inner circumference is also turned true and smooth, and two, three, four, or any suitable number of projections or jutting out pieces *e, e*, fixed thereon, so as to make the cap or caps and those parts of the outer circumference of the drum or wheel which is covered by the cap or caps steam tight, either by ground metal joints, hemp, packing, or any of the usual modes of making steam joints.

The cap or caps, which may be made of iron, brass, or any other suitable material, each covering any part not exceeding one half of the outer circumference of the wheel *d*, are properly fixed by holding down bolts, sufficient to resist the force of the steam in the chamber *g*.

The steam coming in at the top of the cap or caps, through the pipes *h*, forces round the wheel by the help of the faller or steam fulcrum *i*, which is a piece of iron of any length or width, according to the power of the machine, moving on two centres at *k, k*, and is faced with copper or any other suitable material. It describes the arc of a circle, as it is propelled upwards by the projecting or jetting out pieces *e, e*, as the wheel or drum revolves round. The facing sides and bottoms of this faller or steam's fulcrum is made steam tight, either by ground metal joints, springs, hemp, or in any of the usual modes known of making steam joints and valve facings. The faller or steam fulcrum is then pressed or forced downwards upon the circumference, by a spring or springs *l, l*.—[*Inrolled in the Inrolment Office, November,* 1831.]

To Joseph Gillott, *of Birmingham, in the county of Warwick, steel pen maker, for his invention of an improvement in the making or manufacturing of metallic pens.*—[Sealed 27th September, 1831.]

The Patentee states, that his improvement in the making or manufacturing of metallic pens, consists in forming on the nibs of metal pens, elongated points, by straight parallel pieces, instead of sloping the parts of the nibs, as in metallic pens of the ordinary construction.

He says, I make the two sides of the elongated points parallel lines (see Plate IX, figs. 16 and 17); or the metal of an equal width, from the extreme ends of the parts *a*, to the shoulder *b*, as fig. 16, by means of which an elongated point is obtained, that will preserve its original fineness of nib until it is worn down to the shoulder.

The same sort of elongated point may be made, without any shoulder at the termination of the nib part of the pen, but merging at the upper end into the nib, by a slope, as at *c*, in fig. 17.

The Patentee says, in conclusion, I hereby desire it to be understood, that I claim as my invention the making of these elongated parallel points to pens, of any width and of any length, from the shoulder or slope of the nib to the end of the point, as may be required; and also the applying of this my invention of elongated points, formed by parallel pieces, to all metallic pens, of whatever shape or construction now known or in use, without regard to their various springs, slots, or openings, in the upper parts of the said metallic pens.—[*Inrolled in the Petty Bag Office, November*, 1831.]

To JOSHUA PROCTOR WESTHEAD, *of Manchester, manufacturer, for his having invented certain improvements in the manufacture of small wares.*—[Sealed 23d May, 1831.]

ARTICLES usually denominated *small wares*, are of the tape kind, and narrow bindings, of cotton, linen, silk, or worsted fabric; the improvements therefore above alluded to apply to the construction and mode of working a loom for weaving those kind of goods.

"My certain improvements in the manufacture of small wares consists in the adaptation and application of certain machinery or apparatus to small ware looms of the ordinary construction, by means of which I obtain the following advantages:—The regular taking up of the tape or cloth as it is woven, a greater facility of varying the vibration of the lay, together with the saving of room required for a range of looms to stand on.

The improvements by which these advantages are obtained, and of which my invention consists, are effected in the following manner, as will be more clearly seen by reference to the figures shewn in Plate IX.

Fig. 14, represents an end view, and fig. 15, a front view of part of a small ware-loom, in which views many of the ordinary parts of the loom are omitted, and only such parts delineated as are required to shew the position in which my improvements are applied. The course of the cloth or tape in progress of manufacture is shewn by the line andarrows which point the direction in which it passes through the loom, and that part of my improvement by which the tape or cloth is regularly taken up or disposed of when woven will be seen by reference to fig. 14, where A, represents a ratchet wheel revolving freely on a fixed axis which is attached to the framing.

This wheel A, is driven in the direction of the bent arrow on its periphery by a click or dog marked *a*, supported on the stud B, on which it vibrates, and is held firmly to the wheel A, by the weight of a tail piece beneath. The stud B, is connected to the weighted lever C, which moves in a perpendicular direction on its centre *c*; D, D, represents a connecting rod attached at its upper extremity to a short arm E, projecting from the top of the lay, and at its lower extremity to the lever C, so that at every vibration of the lay the lever C, and click or dog *a*, are also vibrated in a perpendicular direction, whereby the dog or click *a*, having a gatherer or tooth in the ratchet A, forces it forward in the direction of the bent arrow already named.

On the same stud or centre which supports the ratchet A, and connected with the ratchet A, is placed a bevel wheel. This bevel wheel gears into another bevel wheel is fixed on a small shaft carrying the screw or worm H, which takes into and drives, the worm wheel I, seen at fig. 15.

In the fig. 15, it will be seen that the shaft *i*, *i*, on which the same wheel I, is placed, is carried along the front of the loom, and consists of a succession of fluted rollers, over which the several ends of cloth or tape pass, after leaving the breast beam of the loom. Over each of these fluted rollers is placed a pressing roller, marked *m*, which is held to the fluted rollers by means of levers and weights, so that the tapes or cloth, compressed between the fluted rollers and pressing rollers *m*, are regularly drawn forward at every vibration of the lay, by means of the movements already described.

The speed of the taking-up movement is regulated by the relative sizes of the bevel wheels, which can be changed so as to suit the exact delivery of the tape or cloth as it is woven. It must also be remarked, that when the tape or cloth has passed through the breast beam, it is carried under and over two rods, for the purpose of increasing the friction, and holding the tape firm, so that it is completely stationary while weaving, except at the period when the lay returns to strike the weft home, which is exactly the same period at which the dog or click *a*, forces forward the ratchet A; and thereby takes up the exact amount of tape or cloth, which the last strike of the beam or lay is completing.

My next improvement, by which I am enabled to save room in placing a range of looms, and to vary the traverse of the lathe with greater facility, consists in the arrangement of two circular plates, (discs) or cheeses as they are called by workmen, placed at the opposite ends of the driving shaft as seen at P, P, fig 14; and the fixing of the driving pulley on the same shaft between them, which arrangement enables me to place any required number of looms close together, I thereby save the room hitherto required for the driving pulley on the out side of the framing an advantage which cannot be gained in small ware looms hitherto constructed, either with two cranks or with a crank and cheese. The traverse of the lathe is varied, and made to correspond in the two cheeses by varying the possition of the studs marked N, best seen in figs. 14, which is not only done with great facility, but is much more readily replaced when required to be renewed than in small ware-looms hitherto constructed, in which it is well known to workmen that any repairs of the cranks, for which I substitute the two cheeses P, P, or even the making such cranks to correspond accurately at first, is attended with considerable difficulty.

Having now described my invention, I shall conclude by stating that I do not claim as of my invention any distinct or well known portion or part of such apparatus as hereinbefore described, as applied to small ware-looms for the purpose of taking up the tape or cloth when woven by means of the fluted rollers on the shaft marked *i*, *i*, in connection with the ratchet A, and other various movements, and parts receiving motion from the vibration of the lay or other convenient motion of the loom, and I further claim as of my invention the substitution of two plates or cheeses (discs) instead of two cranks or a crank and cheese, for the purpose of gaining room and facilitating any required variation in the traverse of the lay as hereinbefore described.—[*Inrolled in the Inrolment Office, November,* 1831.]

JONES *v.* PEARCE.

[In our last we gave a report of the trial, Jones *v.* Pearce, on an infringement of patent right. As the summing up of the Judge on that occasion confirmed an important point on the patent laws, and established a new view, which the courts have recently taken on the subject, we deem it expedient to give the Judge's opinion verbatim, which was delivered in the following words:—

Mr. Justice Patteson, at the conclusion of his summoning up, said,

Now, Gentlemen, if on the whole of this evidence, either on the one side or the other, it appeared this wheel, constructed by

Mr. Strutts' order, in 1814, was a wheel on the same principles, and in substance the same wheel as the other for which the plaintiff has taken out his patent, and that was used openly in public so that every body might see it, and had continued to use the same thing up to the time of taking out the patent; undoubtedly then that would be a ground to say that the plaintiff's invention is not new, and if it is not new, of course his patent is bad, and he cannot recover in this action; but if, on the other hand, you are of opinion that Mr. Strutts' is an experiment, and that he found it did not answer, and ceased to use it altogether, and abandoned it as useless, and nobody else followed it up, and that the plaintiff's invention which came afterwards was his own invention, and remedied the defect, if I may so say, although he knew nothing of Mr. Strutts' wheel—he remedied the defects of Mr. Strutts' wheel, then there is no reason for saying the plaintiff's patent is not good; it depends entirely upon what is your opinion, upon the evidence with respect to that, because, supposing you are of opinion that it is a new invention of the plaintiff's, the patent is then good; then the only remaining question would be, whether the defendant has or has not infringed the patent. Now, as I have told you before, it seems the defendant has constructed a wheel whose construction is on the suspension principle,—that alone would not make it an infringement of the plaintiff's patent, because the suspension principle might be applied in various ways; but if you think it is applied in the same way as according to the plaintiff's patent is applied, then the want of two or three circumstances in the defendant's wheel, which is contained in the plaintiff's specification, would not prevent the plaintiff recovering in this action for an infringement of his patent; it would be quite a different thing if it was shewn that the defendant had had communication long before with Mr. Strutts', and had taken up Mr. Strutts' invention in Derbyshire, and had constructed something like Mr. Strutts', without any knowledge of the plaintiff's patent, and had actually borrowed it from Mr, Strutts, which was good for nothing; it would be the hardest possible thing to say that this was an infringement of the plaintiff's patent, but it merely comes to this by reason of the variance between the defendant's and the plaintiff's; it is only less useful and less desirable, but is in effect the same thing, then the two points for your consideration clearly are these—whether the plaintiff's invention is new, and if new, whether the defendant has so constructed his wheel as that that is an imitation of the plaintiff's patent; if you are of opinion for the plaintiff on both those points, your verdict will be for the plaintiff—but if you are of opinion on either of these two points against the plaintiff, then your verdict will be for the defendant; but you will be so good as to tell me upon what ground it is, whether it is upon the ground that the plaintiff's invention is not new, or upon the ground that the defendant's is not an infringement, because it may make a material difference hereafter, because you generally find these cases do not rest with the Judge and Jury, but it remains for another Court to see whether the decision which has been come to is right or not, therefore you had better be very specific. The Damages I think are a matter of no consequence.

The Jury consulted together for a few minutes.

The Foreman of the Jury.—My Lord, is it in evidence at all that the defendant had either used or sold the wheels?

Mr. Justice Patteson.—As far as regards that, the evidence is, that the witness Drake saw them; he says that the defendant is an ironmonger, that he saw the two wheels at his place, and that the defendant told witness he had made them on a new principle, (the witness was sent to see them); he said he was going to try them in a few days, and he said if I would leave my address he would know where to send to me; he is not certain whether he said he had been in London or not.

The Foreman.—Is it necessary, my Lord, that he should have sold or used them?

Mr. Justice Patteson.—Not that he sold them; if he made them, it is not necessary that he should have sold them; if he made them that is sufficient.

A Juryman.—If he made them from mere experiment would that be sufficient?

Mr. Justice Patteson.—I think the witness said that they were on the gig.

Mr. Rotch.—One of them, one was on the gig.

Mr. Justice Patteson.—One was on the gig and the other was lying against a bench, and he said he was going to try them, and if I would leave my address he would let me know. Now whether you can collect from that, he being an ironmonger, that he made them for the purpose of sale, I think if you look at his letter that will put the matter quite clear.

Mr. ————.—Will your Lordship allow me to draw your attention to the terms of the patent, which is "for making" as well as "selling?"

Mr. Justice Patteson.—One of the counts of the declaration is for making as well as selling. If he had made a model for an experiment, it would be another thing, but I think the terms of this letter will put that beyond doubt. (Mr. Justice Patteson here looked at the letter). I do not see there is anything in this letter which throws any light upon it: the one wheel that was seen was seen upon the gig by the witness, and the other by the side of it. I see the terms of the patent are "without leave or license make," &c. &c. Now if he did actually make these wheels, his making them would be a sufficient infringement of the patent, unless he merely made them for his own amusement, or as a model, that could not be.

The Jury after consulting together for a few minutes, returned a verdict for the plaintiff on both points.

Mr. ————.—Will your Lordship be pleased to certify for a Special Jury in this case?

Mr. Justice Patteson.—Certainly.

SOCIETY OF ARTS, ADELPHI, LONDON.

The Society have adjudged Rewards for the following Subjects received and approved during their Session, 1831-1832.

IN THE CLASSES OF MECHANICS, CHEMISTRY, AND COLONIES AND TRADE.

To J. Wilson, Green, Esq., Newton Abbot, Devon, for his floors and frames for large ships, the gold Isis Medal.

To Mr. T. Medlen, Gill-street, Limehouse, for his improved ship's capstan, the large silver medal.

To Mr. W. Kennish, for his method of concentrating a ship's broadside, the gold Isis Medal.

To Mr. Andrew Smith, Princes-street, Leicester-square, for his improved cramp for flooring boards, the large silver Medal.

To Mr. J. Hall, Jun., for his improved sashes for Gothic windows, the silver Isis Medal.

To Mr. C. Taperell, Penton-place, Pentonville, for an improved spindle for mortice locks, the silver Isis Medal and 5*l.*

To Mr. W. H. Perkins, Hoddesdon, Herts, for an improved cawl for ventilating stables, the silver Isis Medal.

To Mr. W. T. Penny, Castle-alley, Whitechapel, for a cutting plough for stationers, 5*l.*

To Mr. T. Lane, Stockwell, for his instrument for describing spirals, the large silver Medal and 15*l.*

To Mr. M. H. Shuttleworth, Chapel-place, Poultry, for his machine for drawing lines towards an inaccessible point, the large silver Medal.

To Mr. H. Slack, Berner's-street, Oxford-street, for his dissecting microscope, the silver Isis Medal.

To Mr. Edm. Turrell, Clarendon-street, Somers-town, for his improved stage for a microscope, the silver Isis Medal.

To Mr. J. Holland, Manor-place, Walworth, for his triplet for microscopes, the large silver Medal.

To Mr. Corn. Varley, Charles-street, Somers-town, for his lathe for grinding and polishing large lenses and specula, the large silver Medal.

To Mr. Geo. Hennekey, Holborn, for his gauge for standing casks, the silver Isis Medal.

To Mr. J. Hemming, Brecknock-crescent, Camden-town, for his safe tube for explosive gasses, the large silver Medal.

To Alex. Riley, Esq., for importing a flock of Cashmeer-Angora goats, the gold Isis Medal.

To N. Wallich, M.D. F.R.S. Superintendent of the Botanic Garden of Calcutta, for specimens of Indian woods collected and described by him, the gold Ceres Medal.

IN THE CLASS OF POLITE ARTS.

AMATEURS.—FOR COPIES.

To Mr. R. W. Roberts, Mercer-street Long-acre, for a copy in pen and ink of a head, the silver Palette.

To Mr. L. H. Shepheard, Guilford-street, Russel-square, for a copy in pencil of a landscape, the silver Isis Medal.

To Mr. Aug. Staunton, Craven-street, Strand, for a copy in pencil of animals, the silver Palette.

To Mr. H. J. Vully, Angel-lane, Hammersmith, for a copy in chalk of an historical subject, the silver Isis Medal.

To Miss Harris, Lambs-conduit-street, for a copy in Indian ink of a head, the silver Isis Medal.

To Miss Eliz. Langmore, King-street Finsbury-square, for a copy in chalk of a head, the silver Isis Medal

To Miss H Warlters, Bloomsbury-square, for a copy in chalk of ahead, the silver Palette.

To Miss Fisher, Holly-terrace, Highgate, for a copy in water celours of a print, the large silver Medal.

To Miss R. F. Tyreman, Euston-square, for a copy in water colours of a portrait, the silver Palette,

To Miss M. Stace Lawson, Turnham-green, for a copy in miniature of a portrait, the large silver Medal.

To Miss Eliz. Jane Orger, Tooting, for a copy in pencil of a landscape, the silver Isis Medal.

To Miss Leppingwell, Croydon, for a copy in pencil of a landscape, the silver Palette.

To Miss E. Manning, Newman-street, for a model of a bust from the antique, the large silver Medal.

For Originals.

To Mr. H. Browne, Sidmouth-street, Gray's Inn Road, for a group of figures in pencil, the silver Isis Medal.

To Mr. R. S. E. Gallon, Royal Hospital, Greenwich, for an historical composition of figures in oil, the gold Isis Medal.

To Mr. Jos. Tanner, Little Russell-street, Covent Garden, for a portrait in oil, the silver Isis Medal.

To Mr. J E. Nichols, Shrubbery House, Putney, for a drawing of a Landscape, the silver Isis Medal.

To Mr. Douglas Morrison, Datchet, near Windsor, for a drawing of a landscape, the silver Palette.

To Mr. J. Absolon, Jun. Bridge Road, Lambeth, for a portrait in chalk, the silver Palette.

To Miss Sharpe, Chiswick Mall, for a finished drawing from a figure, the silver Isis Medal.

To Miss L. J. Holder, Dartmouth-street, Westminster, for a portrait in water colours, the large silver Medal.

To Miss F. Crockford, Sussex Place, Regent's Park, for a landscape in water colours, the large silver Medal.

To Miss Wiggins, Gloucester-place, Portman-square for a painting in oil of a landscape, the large silver Medal.

To Mrs. J. Docker, Terrace, Putney, for a painting in water colours of flowers, the silver Isis Medal.

To Miss Eliz. Larkin, Alfred-place, Bedford-square, for a composition in water colours of flowers, the silver Palette.

To Miss L. S. Welby, Great Russell-street, Bloomsbury, for a composition in water colours of vegetables, the large silver Medal.

To Miss M. A. Plant, Friday-street, Cheapside, for a composition of flowers in water-colours, the silver Isis Medal.

To Miss A. E. Cole, Alpha-Road, Regent's-Park, for a lithographic drawing, the large silver Medal.

Students in Architecture.

To Mr. James Wilson, Lower Seymour-street, Portman-square, for a drawing in perspective from a Corinthian capital, the large silver Medal.

To Mr. Geo. Mair, for an original design for an ornamental lodge, the large silver Medal.

To Mr. J. Douglas Hopkins, Cleveland-street, Fitzroy-square, for an original design for an ornamental lodge, the gold Isis Medal.

New Patents

GRANTED IN ENGLAND IN 1832.

To Edward Garsed, of Homerton, in the parish of Saint John, Hackney, in the county of Middlesex, gentleman, and Alfred Robinson, of Mile End, in the parish of Saint Dunstan, Stepney, in the said county, merchant, for their having in vented or found out certain improvements in apparatus for heating, warming, and ventilating drying houses, rooms, buildings, ships, and mines.—22d June, 6 months.

To Frederick William Isaac, of Charlotte-street, Fitzroy-square, in the county of Middlesex, ivory, tortoise shell, and pearl worker, for his having invented certain improvements in ornamenting the finger keys and other parts of piano fortes, organ, and other musical instruments.—28th June, 6 months.

To James Macdonald, of the University Club-house, Pall Mall East, in the county of Middlesex, gentleman, that in consequence of a communication made to him by a certain foreigner residing abroad, he is in possession of an invention of an improved construction of railways.—29th June, 6 months.

To Alexander Beattie Shankland, of Liverpool-street, in the city of London, Esq. that he has lately had communicated to him by a foreigner residing abroad, a new method of spinning wool,—5th July, 2 months.

To William Daubney Holmes, of St. John-square, in the county of Middlesex, engineer, for his having invented or found out a new method of heating houses and other buildings, and of applying heat to various manufactures and other purposes.—19th July, 6 months.

To Thomas and Robert Wedlake, of Hornchurch, in the county of Essex, agricultural instrument makers, for their having invented certain improvements in ploughs, particularly the shares applicable to the same and other ploughs.—19th July, 2 months.

To Robert Hicks, of Wimpole-street, in the county of Middlesex, Esq., for his having invented an improved method of an apparatus for baking bread.—19th July, 6 months.

To William Hodge of Margaret-place, Dover-road, in the county of Surrey, hat dyer, for his having invented certain improvements in apparatus for dyeing hats.—19th July, 6 months.

To Joshua Wordsworth, of Leeds, in the county of York, machine maker, for certain improvements in machinery for preparing, drawing, roving, and spinning flax, hemp, wool, and other fibrous materials.—26th July, 6 months.

To Miles Berry, of Chancery-lane, in the parish of St. Andrew, Holborn, in the county of Middlesex, civil engineer and mechanical draftsman, in consequence of a communication made to him by a certain foreigner residing abroad, for certain improvements in the construction of presses applicable to various purposes.—26th July, 6 months.

CELESTIAL PHENOMENA, FOR AUGUST, 1832.

D.	H.	M.	
1	0	0	Clock before the ⊙ 5 m. 59 s.
1	0	0	⊙ rises 4h. 19. sets 7 h. 41 m.
1	9	13	♃ rises.
1	10	35	♂ rises.
3	10	49	☽ in □ or first quarter.
3	13	14	♃'s second satellite will immerge.
4	0	0	Vesta R. A. 11 h. 9 m. dec. 10. 56. N.
4	0	0	Juno R. A. 11 h. 35 m. dec. 5. 28. N.
4	0	0	Pallas R. A. 0 h. 9 m. dec. 4. 27. N.
4	0	0	Ceres R. A. 2 h. 50 m. dec. 6. 1. N.
5	0	0	Clock before ○ 5 m. 40 s.
5	0	0	⊙ rises 4 h. 24 m. sets 7 h. 36 m.
6	8	21	☽ passes the meridian
6	10	40	Jupiter's third satellite will immerge.
6	12	50	Jupiter's first sat. will immerge.
7	0	14	♀ passes the meridian.
7	14	43	♃ passes the meridian.
8	16	0	☽ in Apogee.
9	10	46	☽ passes the meridian.
10	0	0	Clock before the ⊙ 5 m. 3 s.
10	0	0	⊙ rises 4 h. 34 m. sets 7 h. 26 m.
10	15	50	Jupiter's second sat. will immerge.
11	2	28	Ecliptic opposition or ○ full moon.
13	14	42	Jupiter's third sat. will immerge.
14	6	28	☽ in conj. with Jupiter long. 27. in Pisces, ☽ lat. 4. 14. S. Jupiter lat. 1 30. S. diff. of lat. 2. 44.
15	0	0	Clock before the ⊙ 4 m. 11 sec.
15	0	0	⊙ rises 4 h. 43 m. sets 7 h. 17. m.
15	2	25	☽ passes the meridian.
15	9	14	Jupiter's first sat. will immerge.
15	13	41	Jupiter's fourth sat. will immerge.
16	1	38	☿ passes the meridian.
18	7	7	☽ in conj. with ♂ long. 18. in Taurus, ☽ lat. 5. 3. S. ♂ lat. 2. 5. S. diff. of lat. 2. 58.
19	6	33	☾ in □ or last quarter.
20	0	0	Clock before the ⊙ 3 m. 6 sec.
20	0	0	⊙ rises 4 h. 52 min. sets 7 h. 8 min.
20	6	39	☽ passes the meridian.
21	10	26	Jupiter's second sat. will immerge.
22	1	27	☿ passes the meridian.
22	13	22	Jupiter's first sat. will immerge
22	16	54	⊙ enters Virgo.
24	0	0	Vesta R. A. 11 h. 45 m. dec. 7. 4. N.
24	0	0	Juno R. A. 12 h. 2 m. dec. 3. 8 N.
24	0	0	Pallas R. A. 0 hr 8 m. dec. 1. 12. N.
24	0	0	Ceres R. A. 3 h. 0 m. dec. 6. 18. N.
24	0	0	☽ in Perigee.
24	7	50	Jupiter's first sat. will immerge
24	10	40	☽ passes the meridian.
25	0	0	Clock before the ⊙ 1 m 50 s.
25	0	0	⊙ rises 5 h. 2 m. sets 6 h. 58 m.
25	9	44	Ecliptic conj. ● or new moon.
26	0	13	☽ in conj. with ♀ long. 11. in Virgo, ☽ lat. 3. 14. S. ♀ lat. 1. 25. N. diff. of lat. 4. 39.
26	22	8	☽ in conj with ☿ long. 25. in Virgo. ☽ lat. 4. 9. N. ☿ lat. 4. 1. S. diff. of lat. 8. 10.
26	0	0	☿ stationary.
27	1	31	☽ passes the meridian.
28	13	1	Jupiter's second sat. will immerge
29	15	17	Jupiter's first sat. will immerge.
30	0	0	Clock before the ⊙ 24 sec.
30	19	0	♀ in conj. with ♄ diff. of dec. 32.
30	0	0	⊙ rises 5 h. 11 m. sets. 6 h. 49 m.
30	3	56	☽ passes the meridian.

J. LEWTHWAITE. Rotherhithe

A remarkable high tide may be expected about the 27th or 28th of this month, upon the southern coast of our island. It will be high water at London Bridge on the 27th at 36 minutes past 3 in the afternoon, and on the 28th at 9 minutes past 4 o'clock.

METEROLOGICAL JOURNAL,

For June and July, 1832.

1832.	Thermo.		Barometer.		Rain in inches.	1832.	Thermo		Barometer.		Rain in inches
	Hig.	Low	Hig.	Low.			Hig.	Low	Hig.	Low.	
JUNE 26	71	43	30,09	30,03		JULY 11	77	55	29,71	29,68	,05
27	74	45	30,22	30,14		12	75	53	29,65	29,83	
28	77	43	30,34	30,29		13	75	53	29,74	29,72	,375
29	77	51	30,35	Stat.		14	69	54	29,99	29,95	,475
30	74	53	30,32	30,29		15	73	46	30,29	30,20	,1
JULY 1	77	41	30,27	30,23		16	73	51	30,22	30,14	
2	76	41	30,14	Stat.		17	82	54	30,11	30,04	
3	71	41	30,10	30,04		18	69	50	30,04	30,00	
4	79	46	29,98	29,94		19	68	45	30,11	30,06	
5	74	52	29,95	Stat.		20	65	40	30,16	30,13	
6	72	51	29,89	29,76		21	63	42	30,20	30,18	
7	71	45	29,84	29,73		22	62	40	30,14	34,13	
8	71	40	29,86	29,81		23	63	38	30,13	Stat.	
9	73	50	29,83	Stat.		24	67	48	30,15	30,11	
10	73	55	29,87	29,84		25	69	49	30,15	30,11	

Edmonton. CHARLES HENRY ADAMS.

THE

London

JOURNAL OF ARTS AND SCIENCES,

AND

REPERTORY

OF

PATENT INVENTIONS.

No. V.

(CONJOINED SERIES.)

Recent Patents.

To Cornelius March Payne, *of Stratford, in the parish of West Ham, in the county of Essex, silk-printer, for his having invented or discovered certain improvements in printing silks, cotton, and other goods or fabrics.*—[Sealed 3rd December, 1831.]

These improvements apply principally to the printing of silk handkerchiefs and shawls, they may however be adapted to the printing of calicoes and other goods which receive their patterns or devices from engraved copper plates, or engraved copper cylinders, the object being both to diminish the first cost or expense of engraving such copper plates or cylinders, and to afford the means of producing them with less delay than heretofore, so as to bring a new device or pattern quickly into the market.

The invention consists in the adaptation of small plates or cylinders, upon which the patterns or devices are to be engraved, or only parts of the complete patterns or devices, are engraved; which plates or cylinders have, by the machinery to which they are adapted, peculiar motions given to them, so that by several impressions being taken from the said plates or cylinders, the complete or entire pattern may be formed on the handkerchief, shawl, or piece of silk, or other goods. And the invention extends also to the construction of the presses or parts of the presses by which the said plates or cylinders are to be worked, and the impressions taken from them.

It is proposed to employ a copper plate of one quarter the size of the handkerchief intended to be printed, upon which plate one quarter of the entire pattern or device is to be engraved; and when from this plate one fourth part of the pattern has been printed upon the handkerchief, the plate is to be shifted in the press, so as to enable it to print a second portion of the pattern upon a blank part of the handkerchief and so on, producing by one quarter plate the entire pattern of the handkerchief at four operations.

Plate X. fig. 1, is a longitudinal section of a machine of the ordinary construction for printing silk with the improvements adapted thereto; fig. 2, is a horizontal view of the same; *a*, is one of the copper plates, with the fourth part of a pattern or device engraved upon it, which is secured by clamps to the plank *b*. This plank is made to slide laterally upon the rails *c*, *c*, which form part of the carriage *d*, *d*, that the pate moves upon in and out the machine. There are adjustable screws *f*, *f*, placed in the side rails of the carriage, which act as stops to determine the exact position of the plate, so as to cause the two impressions which are given side by side to join accurately.

The plain silk or other goods intended to be printed is distended in an endless web over rollers, as shewn at *g*, *g*, in the figures, and the plate is inked, or receives its colour by hand in the usual way, and is cleared off by the doctor *h*.

On the workman throwing the machinery into gear, and turning the winch or handle of the fly wheel, the plate with its carriage is run into the press between the goods under the top roller *i*, and the D roller *k*, and the impression is, by this means given from the plate *a*, to the plain silk *g*, as shewn at A. The press being now thrown out of gear, by means of the lever *l*, and clutch box *m*, after the plate has given the first impression, the carriage *d*, runs back again, and the piece of goods *g*, also returns a distance exactly equivolent to the length of that portion of the pattern which has been printed. This may be done by any convenient machinery connected with the fly-wheel shaft, or the first mover of the press if it is worked by power; or the workman attending the press may turn back the stop roll *n*, by a lever.

After the first impression has been given to the portion of the handkerchief or shawl, the plank with the copper plate is to be shifted laterally upon its carriage up to the opposite stops, where it is to be again supplied with ink or colour, and on running the carriage forward as before into the press, another impression of the plate is given, which produces the second quarter of the handkerchief, as at B; and by like means, that is by shifting the plate, the third and fourth impression is given, which completes the device.

The plate above described, gives the filling up, or the internal parts of handkerchiefs only, and it is intended to put on the borders round the several handkerchiefs by means of a hand block in the ordinary way; but the plates may be engraved with one quarter of the border occupying two sides of the angle, as at fig. 3. This plate, however, in addition to its sliding laterally as above described, is intended to turn upon a pivot in its centre, shewn by dots at *z*, or instead of sliding laterally, it may, as in fig. 4, turn upon a pivot *y*, at the corner, so as to be brought into the several positions for printing the whole handkerchief, without any lateral sliding movement.

The improved cylinders for printing similar kinds of goods, are intended to have one quarter, or half of the device or pattern of the handkerchiefs or shawls engraved upon their peripheries, and they are to be mounted on a mandril, as shewn in the front view of a cylinder printing machine at fig. 5. The dimensions of the handkerchief printed by the engraved cylinder will depend upon the diameter and length of the engraved cylinder; that shewn in the figure will produce a succession of halves of the pattern, by which one half of the piece of goods may be printed from end to end, and on turning the engraved cylinder upon the mandril to the reverse end, the other half of the piece may be printed, so as to complete the patterns of all the handkerchiefs.

The Patentee concludes by saying,—having particularly described and ascertained the nature of my said invention, and the manner in which the same is to be performed, I wish it to be understood that I do not mean or intend to claim as of my invention, any of the parts of the printing press that I have necessarily exhibited in explaining the nature of my invention which are not new, or have been before used in presses for printing silk, calico, or other goods and fabrics.

But I do claim as my invention the use of plates or cylinders having only a portion of the pattern engraved upon them as above described, which plates or cylinders have by my invention the peculiar movements given to them for taking the complete pattern by repeated impressions. And also the improvements in the construction of the presses, or the parts of presses, for printing these improved plates or cylinders, as herein particularly described.—[*Inrolled in the Roll's Chapel Office, June,* 1832.]

Specification drawn by Messrs. Newton and Berry.

To CHARLES AUGUSTIN BUSBY, *of the Wick Road, in the parish of Stove, near Brighthelmstone, in the county of Sussex, architect, for his invention of an improved method of producing the circulation of fluids through pipes, cisterns, or other vessels, applicable to the warming or cooling the interior of buildings, and to other purposes.*—[Sealed 15th May, 1832.]

THE object of this invention is to produce a continuous current of hot water, for the purpose of emitting heat for warming the atmosphere of apartments, shops, manufactories, warehouses, drying rooms, hot houses, and other buildings, the particular feature of which is, that the hottest part of the current of water by this improvement, is made to descend from the boiler, and the cooler water to rise up into the boiler, which is contrary to the natural course of fluids, where the heated portion ascends by its levity and the colder part descends by its gravity.

The contrivance consists in producing a small degree of vacuum over the top of the ascending pipe, which brings the water into the boiler, by means of a rapidly revolving beater driven by a smoke jack fly in the chimney.

The colder fluid thus raised by the vacuum, allows the hotter fluid to pass down the pipe at the reverse end of the range, and hence a continued current of hot water is kept flowing from a boiler placed in any upper part of the building.

The following is the Patentee's explanation of his invention:—

My "improved method of producing the circulation of fluids," whether hot or cold, through pipes, cisterns, or other vessels, consists in applying external mechanical force generated by a current of smoke or air acting in an apparatus similar to a smoke jack, without reference to the direction or position of such pipes or vessels in which the fluid is contained, whether upward, horizontal, downward, or oblique, in which the said pipes, cisterns, or other vessels, may be extended or placed with respect to the level of that part of the apparatus, at and by which the said circulation is caused or created; and the contrivance which I have invented and applied to employ the said mechanical force to cause or create the said circulation consists as follows:—

I provide a cistern or boiler (for which a cylindrical shape is best) and pierce two holes in the circumference near the bottom, and fix a pipe, water-tight, through one of the said holes, so as to enter and project within the said cistern or boiler, and so that the open end so projecting within shall just reach to, or near to, the centre of the cistern or boiler near the bottom. I extend the said pipe externally from the said cistern or boiler in any direction through any building, vault, ship, or carriage, and to any length upward, horizontally, downward, or obliquely, that may be required; and then I bend the said pipe and extend it back again, in any required direction, upward, horizontally, downward, or obliquely, so as that its other open extremity shall just reach to the other opening in the said cistern or boiler; into which opening I fix (water tight) the said other extremity, so as that it shall not project at all, or as little as possible within the said cistern or boiler, and I then fix a circulator, constructed and fixed like the wheel of a winnowing machine, on a perpendicular axis within the cistern or boiler, with its centre or axis as nearly as possible over that end of the pipe which reaches to, or near to, the centre of the cistern or boiler, and I make the axis of the said circulator to rise above the cistern or boiler, and to be mechanically connected with, or terminated by, a wheel similar to a smoke jack wheel, so as to cause it to have a rotary motion imparted to it through the agency of the said smoke-jack-wheel, by the mechanical force of a current of smoke or air as may be most convenient. If the said pipe before described be made to rise above the cistern or boiler, the top of the boiler should be closed water tight, and the axis of the circulator be made to pass through a stuffing box in the top, to prevent the escape of fluid.

If now the cistern or boiler and the pipe be filled with fluid, which filling may be performed through an opening to be made for that purpose in the upper part of the cistern, consisting of the said pipe, cistern, or boiler above mentioned, and the circulator be made to revolve by the application of the mechanical force of a current of smoke or air as aforesaid, it will impress upon the fluid within the cistern or boiler a rotary motion, the centrifugal force of which revolving fluid will so act against the fluid in the pipe aforesaid, as to cause the fluid to circulate through the said pipe, so as to run out of the cistern or boiler into the pipe, at that end of the pipe which reaches only to the circumference of the said cistern or boiler, and to run into the cistern or boiler from the said pipe at that end of the said pipe which projects within the said cistern or boiler to the centre, or nearly so, of the said cistern or boiler.

If hot fluid be thus made to circulate through a pipe extended as aforesaid (which pipe may, if required, be enlarged at any part or parts into a cistern or cisterns, or vessels, having any other name) it may be used to impart heat to the interior of any building, vault, ship, or carriage. Or if cold fluid be thus made to circulate, it may be used to abstract heat from the interior of any building, vault, ship, or carriage; and if the whole, or any part of the said pipe, or any of its enlargements, into cisterns or other vessels, as aforesaid, be made to pass through any other fluid, or through any solid or other body, the fluid contained within the said pipe and its enlargements (if any) as aforesaid, may, if required, be made to communicate heat to, or to abstract heat from the said other fluid, solid, or other body, or to be itself cooled or heated as may be required according as the temperature of the circulating fluid may be arranged to be above or below the temperature of the said other fluid, solid, or other body. The mechanical force required to produce a velocity of circulation sufficient for the purpose of communicating or abstracting heat, as above described, is so small, that a fire placed beneath or about the cistern or boiler, containing the circulator sufficient to heat the fluid therein contained, will produce a draft through the chimney or flue carrying off the smoke from the fire; if the said chimney or flue be of proper height and dimensions, sufficient to impart to the smoke jack wheel, if properly fixed in the said flue and connected as aforesaid, or in any other convenient, mechanical, and workmanlike manner, with the circulator aforesaid, such a motive power as to cause the necessary rotation of the said circulator as aforesaid.

And I declare such application of a smoke jack wheel, in combination with the circulator as aforesaid, to be my invention, whether the said smoke jack wheel be moved by smoke or by a current of air produced in any way whatever. And I also declare as my invention the application of a common alternating or other pump, or any modification or multiple thereof, such pump being actuated by a crank, or other mechanical contrivance moved by a smoke jack wheel, as aforesaid, and being to be used in lieu of, or as a substitute for, the said circulator, so as to cause the circulation of fluids through pipes, cisterns, or other vessels, for any of the above purposes; which application may be effected by fixing and extending the said pipes, cisterns, or other vessels, so as to constitute, in effect, one united, continuous, and simultaneous discharging and supplying pipe to such pump, or any modification or multiple thereof; although I consider such application of a common alternating, or any other pump, or any modification or multiple thereof, in combination with a smoke jack wheel, to be in most cases very inferior in point of utility and convenience to the use of a circulator as above described.

To avoid the use of a stuffing box, which will often be found inconvenient where the pipe of circulation, or its enlargement, is carried above the cistern or boiler, a pipe of appropriate diameter, fixed water tight in the top of the boiler, may be carried up from a hole to be made for that purpose in the top of the said cistern or boiler, to a height somewhat exceeding the extreme height of the said pipe of circulation and its enlargements, if any; and the axis of the circulator may be prolonged from the cistern or boiler, through and above the said pipe so carried up, and the communication of mechanical force to the said axis be made above the said pipe in manner aforesaid; the axis of the circulator and smoke jack wheel is to be retained in its proper position in any convenient manner familiar to working mechanics.

And in all applications of the apparatus above described, and in any of its modifications, provision must be made for the escape of air or other elastic fluid which might otherwise lodge within any part of it, and also to allow for the expansion and contraction of the apparatus itself, and of the fluid contained in it, arising from any variation of temperature, by the same means as are now commonly practised in other apparatus used for similar or analogous purposes.

And I also declare, that in all cases the actual and relative magnitudes and forms of the cistern or boiler, and fire place or furnace, and of the circulator and smoke jack wheel, and of the mode of connecting the circulator, and smoke jack wheel, and the diameter, shape, length, and direction of the pipe of circulation, the dimensions of the enlargements therein, as aforesaid, the height of the chimney or flue to carry off the smoke from the fire place or furnace, and the selection of the materials of which the whole or any part of the entire apparatus, or any of its appendages, is to be constructed, must depend upon the circumstanes of the case under which this invention is required to be applied; and which magnitudes and forms, modes of connecting, diameter, shape, length, direction, dimensions, height, and selection of materials, must therefore be determined by the judgment of the person making use of it.

Having now described the nature of my invention, and the manner in which the same is to be performed, I would have it understood that I lay no claim to the various parts herein described which separately are well known and in use; neither do I claim the circulation of fluids for the purpose of conveying heat for heating buildings and other purposes, or for abstracting heat therefrom; but what I claim as my invention is the combining the smoke jack (actuated as aforesaid) as a motive power, with a wheel, or circulator, or pump, for the purpose of producing a circulation of fluids for carrying heat to buildings, and other purposes, or abstracting heat therefrom, as above described.—[*Inrolled in the Inrolment Office, July,* 1832.]

Specification drawn by the Patentee.

No drawing accompanies the specification of this invention, but the Patentee has favoured us with a sketch of the manner in which he has carried the plan into execution. In Plate XI, fig. 1, may be supposed to represent the section of a building intended to be heated by warm water upon this improved plan. At the back of the fire place *a,* situate in the upper part of the building, a boiler *b,* is placed, from which a pipe *c,* passes out on the side to conduct the heated water to the lower apartments. This pipe continues on to *d,* where it may be enlarged for the purpose of giving additional heat in that particular part of the building, from hence the conducting pipe proceeds along the floor; it may be under the floor, or it may, if required, be bent over a doorway, as at *e.* When the water has reached the lowest part of the range, it is intended to raise up the pipe *f,* through the bottom of the boiler *g,* seen best in the transverse section upon an enlarged scale at fig. 2. Within the boiler *g,* immediately over the top of the pipe *f,* a fan wheel or beater *n,* is mounted upon a perpendicular shaft, which passes through the top of the boiler into the chimney. Upon the upper end of this shaft a smoke jack flyer *i,* is fixed, and when the apparatus is in action, the passage of the smoke causes the flyer *i*, to revolve rapidly, and to communicate the same rotary motion to the fan or beater *h*, in the boiler below. The centrifugal motion given to the water in the boiler by these means, produces a small degree of vacuum over the mouth of the pipe *f*, and hence the water constantly rises in that pipe, and supplies the boiler; and a continued current of hot water down the pipe *c*, is maintained as the natural consequence.

An apparatus, exhibiting these principles in operation, has been constructed on the premises of Mr. Eckstein, Ironmonger, Holborn Bars, London, and an exhibition took place a few days ago before a large company of engineers and other scientific gentlemen, who expressed themselves perfectly satisfied with its simplicity and effective operation.

To WILLIAM RUTHERFORD, JUNR. *of Jedburgh, in that part of the United Kingdom called Scotland, writer and bank-agent, for his having invented a combination or arrangement of apparatus or mechanism to be used by itself, or applied to locks, and other fastenings for more effectually protecting property.*— [Sealed 14th April, 1831.]

THE Patentee proposes to construct a lock in connection with a time-piece, which is to be employed to secure any chest or apartment containing property, for any given number of hours, in order that it may not be opened until the appointed time has arrived.

The figures referred to in the specification, represent sundry pieces of mechanism applicable to the purpose of securing the bolt of any lock fixed on the seat, box, or any other part of a vehicle, in which property may be placed; or it may be combined with the lock of any box, chest, or other receptacle, used to enclose property and keep it secure, until it arrives at its place of destination, the necessary time for which must have been previously determined.

Plate X, fig. 6, represents a pinion *a*, fixed on the barrel arbour of a spring clock, or other mechanism actuated by a spring, and regulated by a balance or fly, so constructed as to measure time correctly. This pinion *a*, takes into, and drives a wheel *b*, called the guard wheel, which turns upon a stud as its axle. Upon the face of the guard wheel, there is a circular plate *c*, graduated into hours, which may be moved round on the stud, and set to any time by the index *d*, and made fast by a tightening screw.

There is a notch cut in the side of this guard plate to receive a locking piece *e*, which is an elongation of the bolt of the lock *f*. When the fore part of the bolt *e*, has been passed through the staple *g*, that is locked, for the purpose of making the lid of the box secure, and the guard plate turned round, as at fig. 7, the hinder part of the bolt bears against the circular edge of the guard plate, and of course the bolt cannot be forced back by picklocks, or any other means, until the notch of the guard plate has come opposite to the end of the bolt, and that will not be until the clock has run so many hours as the guard plate had been previously set to.

The Patentee says, " by adapting a spring as the moving power, and regulating that by means of a balance and fly, in a similar manner to that used in the escapements of common watches, the whole will be found to answer perfectly well, although it may be subjected to the motion of a coach, caravan, or any other carriage or vehicle used for the conveyance of property.

In all cases where safes, presses, chests, or any other receptacles for the security of property are immoveable, the use of a clock with a weight and pendulum, is to be preferred, as the weight may by its descent act upon the end of a guard lever so adapted, so as to keep the lock secure until raised by the descent of the weight.

A lever guard of this description is shown in two positions at figs. 8 and 9, upon which the weight of a clock having descended, after running a certain time as previously determined, the lever is raised and the impediment thereby removed, which till then had prevented the bolt of the door lock from being slidden back or withdrawn from its hold.

In this figure there is but one bolt and one lever shown, but the Patentee says, when it is desired, any number of bolts and levers may be combined, so as to be all released by the same means; and as an additional security, a locking bar may be combined with the lever: this may be accomplished in the following manner:—

Fig. 10, represents a front elevation of a pendant locking bar *a*, which swings on a stud at top. At the lower end of the bar there is a small inclined plane with a notch below it as *b*, into which notch the end of a lever *c*, is to be introduced when the guard is set. The clock weight is shewn at *d*, and the progress of its descent is marked by graduations on the pendant bar, of which *e*, is the adjustable index. When the door is fastened, the end of the lever may be inserted in the notch, and the weight drawn up to the height of the hour, at which it is desired to open the lock. The whole being enclosed, it will not be possible to open the lock until the weight has descended and pressed against the inclined plane *b*, which pushes the pendant locking bar aside, and allows the lever to be acted upon by the weight, and the lock to be opened.

In order to prevent the inconvenience which might arise from the clock stopping by any accident, the Patentee proposes to employ two clocks, and concludes by saying, " My invention consists in combining and applying any suitable kind of mechanism, apparatus, or self-acting power or powers with the bolt or bolts of any kind of locks, bars, sliding or drop bolts, or any other fastenings, by the application of which in all or any of the ways previously described, any bolt of a lock, or bar, or other fastening may be secured or locked until such combination of machinery or self-acting power shall have performed certain movements or revolutions; the whole machinery so applied being at all times placed and secured within the press box, safe, or any suitable receptacle protected by its operations.

" And I further declare, that though I prefer the simple, well known, and effective combination of clockwork above described, by the power and action of which, when united and combined in the way and manner I have described, with locks, bolts, bars, or any other suitable kinds of fastenings, may be rendered perfectly secure for any given portion of time (violence alone excepted), yet the same valuable effects may be produced by other combinations of mechanism impelled by any suitable power capable of rendering them self-acting, and thereby performing certain movements in certain given times, such as the old and well known passage of sand, which, falling through a small aperture, may be made to supply in any given time sufficient weight at one end of the locking lever to lift or raise the other end, or *vice versa*."

The same effect may also be attained by using either the well known measure of time called *clepsydra,* or the principles thereof, or any suitable self-acting power capable of being applied as a measure of time, and likewise of producing the necessary and requisite motion of the parts that lock and secure the moveable fastenings above described.

A similar effect may also be produced by consuming oil, or any other suitable inflammable substance or material, which being applied in any suitable vessel on one end of the locking lever, will by its consumption while burning become lighter, and thereby cause the elevation of the end to which it is applied, at any given period of time.—[*Inrolled in the Inrolment Office, October,* 1831.]

To NICOLAS HEGESIPPE MANICLER, *of Union Road, Southwark, in the county of Surrey, chemist; ; and* JAMES COLLIER, *of Canal Grove, NewPeckham, in the county of Kent, civil engineer, for their having invented a new manufacture of useful products from a certain oleaginous substance.*—[Sealed 31st May, 1832.]

THE oleaginous substance above mentioned, from which is manufactured the useful products aforesaid, is the article of commerce known in England by the name of palm oil, and which is sometimes called butter of palm. This substance, in the state it is usually imported into this country, is too thick to be burned in lamps, and not sufficiently concrete and indurated to be manufactured into candles; and has heretofore been almost exclusively used in the preparation of a certain description of soap. The discovery or invention therefore, consists in separating or obtaining from the oleaginous substance before mentioned two products of great utility, and adapted to general consumption, namely, an oil perfectly fluid at the ordinary temperature of the atmosphere of this country, especially suitable for burning in lamps, and generally applicable to those purposes for which oil is used; also, an indurated concrete substance which forms an excellent material for the fabrication of candles.

The mode by which these products may be obtained from the said oleaginous substance, may be considerably varied without materially altering their properties; but the following is the process, proposed by the Patentees, for obtaining the two products of utility before mentioned, and which is found to answer the purpose.

The palm oil, or butter of palm, is placed in a metallic vessel or boiler (which is preferred to be of iron), turned with a close cover and safety valve upon the principle of that which is commonly called a digester, and water in the proportion of about one sixth part to the substance is added; the vessel being well closed, is then submitted to the action of fire, so as to raise the steam to a pressure of two or three atmospheres, which operation is to be continued for about two hours. After the material has been thus prepared, it is to be put into wrappers of linen or woven horse hair, or both may be used, which being placed in strata or layers, separated by metallic plates, or other similar division, and then submitted to powerful pressure gradually applied, will yield the two products already mentioned, viz. a fluid oil, which will be exuded through the wrappers, and a concrete substance which will remain in the wrappers.

The various modes of applying pressure, are too well understood to render necessary, a detailed description of the apparatus, by which that operation is effected: it has been found that a simple screw press practically answers the purpose upon a moderate scale; but the preference is given to an hydraulic press.

The Patentees desire it to be distinctly understood, that their invention consists in the discovery of the aforesaid products in the palm oil, or butter of palm of commerce; and they claim the right of separating or obtaining them by the application of every chemical process or mechanical means, which are adapted to that object, provided of course, that such chemical processes or mechanical means are not monopolized by any existing patent right.—[*Inrolled in the Petty Bag Office, December,* 1831.]

To Arthur Howe Holdsworth, *of Dartmouth, in the county of Devon, Esq. for his having invented improvements in the construction of rudders, and in the application of the same to certain descriptions of ships or vessels.*—[Sealed 19th November, 1831.]

This invention consists in so constructing and applying the rudders to ships or vessels, that they may revolve completely round upon the axle by which they are attached to the vessel, in order that, in whatever direction the vessel may move, the rudder may be readily brought to a proper bearing in the water. The Patentee considers that by this contrivance greater facility will be obtained in steering, while such rudders so applied will be less liable to be carried away when struck by a sea, or from the ship suddenly making sternway, in consequence of the rudders so applied to the ships or vessels being enabled to make a whole revolution on their axis.

It is to be observed that the invention applies only to those descriptions of ships which have a single stern and sternpost, but does not apply to double or twin bodied boats which have rudders placed between them.

In Plate XI, fig. 3, represents the stern of a vessel having the improvements applied thereto; fig. 4, is an edge view of the rudder detached. The axis of the rudder must be carried out from the lower part of the stern post, and stand perpendicularly, as shewn in the figure. It is to be supported at top by a strap and collar, as represented in the detached fig. 5, which strap is made fast to the transom or to the stern frame, as near the hance as conveniently may be, and through the collar the upper part of the rudder passes, and turns in it at *a*.

The lower end of the rudder is supported on an elongated part or continuation of the keel at *b*, where a metal gudgeon is fixed to receive it. The object of so mounting the rudder at a distance from the stern post is to enable it to turn completely round, without coming in contact with the stern post.

It will be seen that this rudder is without the usual pintles, and the front or bearded part is cut to a ridge shape; it will also be seen, that in order to apply the improvements, the stern post of the vessel must be made to stand at such an angle to the axis of the rudder as will afford space sufficient for the rudder to make a complete revolution on its axis.

This rudder may be actuated by a tiller *c*, and tillerropes; in which case there should be a strong pin in the end of the tiller farthest from the rudder, or the end of the tiller may be turned up, as shewn by the enlarged fig. 6. Upon this turned up part of the tiller a swivel should be placed, having two eyes, to which the tiller ropes are attached, or the rudder may be actuated by means of a pinion affixed on an upright shaft working into a horizontal toothed wheel affixed on the head of the rudder, such upright shaft having a horizontal steering wheel in the usual way, or it may be worked by any other of the usual combinations of mechanism employed for steering, care being taken that whatever mode be adopted, whether by tiller or otherwise, a whole revolution can be made by it.

In steering a vessel which has these improvements in the construction and fixing of the rudder applied, it will be necessary, in the event of its being desired, that the ship should make stern way, for the man at the helm immediately to let go the wheel or steering apparatus, and on the ship moving by the stern, the rudder would revolve upon its axis and turn into the space left between the stern post and the axis, and be in a line with the keel: when the helmsman will again take hold of the tiller or wheel, and would be enabled to cause the rudder to take any angle with the keel consistent with the new course of the ship; and when she was required again to make head way, the helmsman would permit the rudder to revolve into the position shewn at fig. 3.

The specification concludes by saying, " Having described the nature of my invention, and the manner of performing the same, I would have it understood that I lay no claim to any of the parts of which the same is composed, but I claim the constructing and applying rudders to ships or vessels in such manner that they may revolve on their axes, and thus in whatever direction a ship or vessel may move, their rudders will always present their proper edges or bearings to the water, as above described."—[*Inrolled in the Inrolment Office, May,* 1832.]

To ROBERT MONTGOMERY, *of the town of Johnstone, in the county of Renfrew, in the kingdom of Scotland, for his invention of a machine for a new mode of spinning cotton, silk, flax, and other fibrous substances, communicated to him by a certain Foreigner.*— [Sealed 26th April, 1832.]

THIS invention consists in a certain addition to the flyers of spinning machinery, whereby such flyers always retain the same position, while the spindles round which the flyers revolve, are caused to rise and fall, for the purpose of laying the spun fibre regularly on the bobbins, the spindles not being permitted to turn, but are fixed to the bottom or traverse rail: by which the flyers and spindles will be less liable to vibration, than those constructed in the common manner.

In order that the invention may be fully understood, the Patentee has appended a drawing (see Plate XI, fig. 7,) which shews five of the spindles mounted in a machine; the other parts of the mechanism being removed as not necessary to the illustration of the present invention.

In this machine the spindle *i*, on which the bobbin is built, does not revolve, it being made fast to the bottom or traverse rail *f*, and is moved, or slidden up and down within the flyer *a*, *a*, carrying the bobbin along with it, in order that the yarn or thread may be laid with regularity on the bobbin, which is loose, but bears upon the boss, which is fixed on the spindle, and is allowed to run on it, which it does by the friction or drag of the yarn or thread, as shewn at the central spindle A.

The rail *h*, *h*, into which the spindles are made fast, is constructed to travel up and down, or traverse exactly in the same manner as in roving and throstle frames, and by a similar kind of apparatus which is well understood.

In spinnng or roving soft twisted yards or threads, they may be laid either on the bobbin, or may be wound upon a tube or shell, as shewn at the spindle B, and which when full will be in a proper state or shape to be placed in a shuttle.

At the spindle C, the yarn is represented as laid on the bare spindle, and in order that the friction should be as much relieved as possible, a small auxiliary spindle is inserted into a hollow part of the fixed spindle, as shewn in section at D. The fitting of the auxiliary spindle into the other must be so easy as to allow of its moving round freely by the drag or friction of the yarn or thread, in the act or progress of being laid on the shell or the bare spindle. On the common mule spindle the cop may be built without an auxiliary spindle inserted into a socket.

It is to be understood that the spindles *z*, though fixed in the lower rail *h*, yet slide up and down within the flyers *a*, by the occasional elevation and depression of *h*, called the coppping rail, and that the flyers, though they revolve, are confined between the rails *b*, and *k*. The flyers are made to turn by means of bands or cords from drums, cylinders, or any other practical contrivance for giving them rotary speed in the way that throstles and roving machines are at present given.

The flyers are shewn at *a, a, a,* with the warves, whirls or pulleys affixed to them, and it will be seen that the two ends of the flyers are connected to the flange or rim on the top of the pulley, " which forms the main feature of the invention, from giving the power of performing the operation as now described, of building the cop upon the common mule spindle equally with the inverted spindle, and also of building the bobbin on the fixed spindle ;" *b, b, b,* are the stay rails, in which the upper parts of the flyers turn; *c, c,* are the side guides for the threads or yarns; the top guides have a hole perforated through each flyer in its centre, which indeed are the ordinary conductors of the thread or yarn, and through which it passes to the side guides on the legs of the flyers to the bobbin or spindle to be wound on, as shewn.

The Patentee has not thought it necessary to shew the whole of a spinning machine, as the invention relates only to the manner of constructing and using the flyers, and the various machines to which the invention may be applied will be well understood by spinners, as well as the means to be employed for raising and depressing the spindles and bobbins, in order to wind the yarns evenly on the cops, which are equally familiar to machine makers.

The Patentee concludes his specification by saying—Having now described the nature of the invention, and the manner of carrying the same into effect, I would have it understood, that although I have shewn parts which are well known, and in use, I lay no claim to the same; but I claim the connecting the ends of the flyer to the driving warve or pulley, and thus being enabled to keep the flyer in the same position, whilst the spindle rises and falls, and carries the bobbin or other instrument to receive the spun fibre up and down with the flyer, for the purpose of laying the spun fibres regularly, in the manner above described.—[*Inrolled in the Inrolment Office, June,* 1832.]

To **John Samuel Dawes**, *of Bromford, in the parish of West Bromwich, in the county of Stafford, iron master, for his invention of certain improvements in the manufacture of iron.*—[Sealed 22nd December, 1831.]

This invention applies to the smelting and remelting of iron, and consists in the introduction of certain materials at the bottom or lower part of the blast furnace or cupola, and in continuing the supply of such materials during the operation of smelting or remelting, in addition to the usual method of charging the said furnaces at or near the top or tunnel head; by means of which the Patentee is enabled to make a larger quantity of iron of a superior quality with a less quantity of fuel, and with less expensive materials than are commonly used, such as coal uncoked, and ironstone untorrified.

The materials used at the lower end of the furnace are charcoal, or any other fuel applicable to the purpose, together with any of the well known fluxes, such as alkalies, alkaline earths, lime, metallic or other oxides.

The means by which the fuel is introduced into the furnace is by conical tubes or hopper feeders, in which the materials are to be placed. These hoppers are fitted to the top of the furnace, severally projecting a little behind the mouth of each blast pipe, which pipes are placed in their usual positions. The tubes of these hoppers, with the blast pipes, communicate with the furnace through large water twyers, or tue holes, or they may be introduced at any other part of the lower end of the furnace as may be found most convenient and suitable.—[*Inrolled in the Inrolment Office, June,* 1832.]

To James Cobbing, *of Bury St. Edmonds, in the county of Suffolk, cordwainer, for his invention of certain improvements on skaits.*—[Sealed 26th January, 1830.[

These implements for skaiting on ice have usually consisted of a smooth piece of polished iron or steel, affixed edgwise to the under part of a wooden sole intended to be strapped to the shoe or boot of the skaiter; the object of the Patentee is to dispense with the wooden sole, and to affix a detached skait iron immediately to the shoe or boot when wanted to be used, by means of a simple mode of attachment.

Three methods of doing this are proposed: the first of which is, by introducing into the shoe or boot when making it, an inner sole of thin plate iron, having two metallic boxes, or sockets soldered, or otherwise affixed to the under part of the plate; the boxes of these sockets are brought through the outer or leather sole flush with the surface, and into these sockets two nibs or hooked pieces on the upper edge of the detached skait iron are intended to be inserted.

The shoes or boots thus made, will resemble in appearance ordinary shoes and boots, and when the wearer proposes to skait in them, he takes the datached skait iron, and introduces the nibs or hooks on the upper edge of the skait iron, into the sockets in the sole of the shoe or boot, and fastens it to the sole by a screw behind. The skait iron is then tightly affixed to the sole, and the wearer may skait in these boots or shoes with perfect ease and safety.

The second contrivance for attaching the skait iron to the sole of the shoe or boot, is by means of two clips, one of which is to be slipped on near the toe, and the other at the heel. The edges of the clips being turned over, will take hold between the sole and upper leather and on being slidden along, as far as they will go, will become tight. The detached skait iron is then to be inserted into two staples, fixed on the under side of the clips, and a small spring bolt in each staple being made severally to pass through small holes in the skait iron, will make it perfectly tight, and secure to the sole of the boot or shoe.

The third mode is, by employing similar clips to be attached to the shoe or boot, and after inserting the skait iron in the staples, making the whole secure by small screws.—[*Inrolled in the Inrolment Office, July,* 1830,]

A mode of attaching skait irons to shoes and boots, very nearly resembling the first mode proposed above, was the subject of a patent granted in 1819, to Mr. W. Milward, of Eaton, Bucks, the particulars of which is described in the 1st Vol. of our First Series, page 25.

To EDWARD COWPER, *of Streatham-place, in the county of Surrey, gentleman, in consequence of a communication made to him by a certain foreigner residing abroad, for certain improvements in the manufacture of gas.*—[Sealed 12th February, 1839.]

THIS invention applies to the production of gas for illumination from oil, tar, turpentine, and other fluid matters, capable of producing when distilled, carburetted hydrogen gas. The fluid which is to be converted into gas, must be poured into a retort, containing red hot coals, the heat of which decomposes the fatty or unctious matters, and converts them into an inflammable gas.

The subject of this patent is a peculiar contrivance for regulating the supply of oil, or other materials to the retorts, which is intended to accommodate the quantity of material delivered to the number of burners supplied, and by that means to dispense with the use of a gasometer altogether.

Plate XI, fig. 10, is an elevation of part of the front of a retort; fig. 11, is a side view of the same, representing the back part only; *a, a,* is the retort of iron as usual; *b,* is a vessel above, containing oil, tar, turpentine, or any other liquid capable of being converted into gas by distillation; *c,* is the pipe through which the material passes to the retort, its flow being regulated by a stop cock turned by the arm or lever *d.*

When the retort is about to be put into operation, the lower cock in the pipe *c,* is to be opened, and the arm *d,* being depressed as in fig. 10, the material will flow freely through into the retort, and the gas generated therefrom will pass up into the chamber *e,* at the back of the retort, (which is occupied with coke or charcoal), and thence down the pipe *f,* into the worm tub, to be refrigerated. From the worm the gas proceeds through a syphon pipe to the box or vessel *g,* from whence it is supplied to the burners through the pipes *h.*

From the box or vessel *g,* the gas passes by the horizontal pipe *i,* into the regulator box *k,* (shewn in section in the front view, fig. 10.) The gas here exerting its elastic force, rises up the perpendicular pipe *l,* and lifts the tube *m,* which is inverted over the pipe *l,* in the water vessel *n, n.* By these means the arm or lever *d,* becomes elevated, the cock partially closed, and the flow of liquid delivered from the vessel *b,* is thereby diminished.

If a very great number of burners, in connection with this apparatus, are now lit, the pressure of the gas in the regulator box or vessel *k,* will of course be reduced;

the tube *m*, will under those circumstances therefore descend, and the arm or lever *d*, with it; opening the cock, and allowing a full supply of the material to pass into the retort.

Thus the apparatus being constructed to supply a certain number of burners, whenever the number of lights are diminished, so as to render a smaller supply of gas sufficient, the pressure of the gas in the regulator box will cause the tube *m*, to rise and partially close the cock, which, reducing the quantity of material that is delivered into the retort, will of consequence diminish the quantity of gas produced. But when a greater number of burners are lit up, the pressure of the gas in the regulator box, will of course be reduced, and the supply of oil, tar, turpentine, or other material to the retorts will be increased by the opening of the cock. The apparatus therefore is in the fullest sense of the word self-regulating, and by its employment any varying number of burners may be supplied with gas, without the possibility of being over charged, and without the use of a gasometer or gas holder.—[*Inrolled in the Inrolment Office, Aug.* 1830.]

To George Frederick Johnson, *of Canterbury, in the county of Kent, Tunbridge ware manufacturer, for his invention of a machine or apparatus which is intended as a substitute for drags for carriage wheels, and other purposes.*—[Sealed 26th January, 1830.]

This invention is the application of a bent lever to be pressed upon the nave of a carriage wheel as a break, for the purpose of preventing, by its friction, the wheel from turning round when the carriage is descending a hill.

The contrivance is shewn in plate XI, at fig. 8, which represents the nave of a wheel seen on its inner side; *a*, is the bent lever, which is proposed to be made of wood. Round the nave there is a rim or hoop of iron, which the lever is to press upon when brought into operation.

Fig. 9, shews the hinder part of a carriage with two wheels, to both of which these bent levers are applied. The fulcrum end of each lever hangs upon a stud fixed in the alxe bed at *b, b,* or it may be suspended in any other convenient way, and the reverse end of each lever is attached to a rod *c, c,* extending across the back of the carriage; the breaks in their ordinary situation standing up free from the naves of the wheels.

In order to bring these breaks under the command of the guard, without the necessity of removing from his seat, a long rod or lever *d,* is attached by a fulcrum pin to the axle bed, and to the rod *c, c,* which passes through a hole in the end of the lever. When it is necessary to stop the wheels, the guard removes the lever *d,* into the situation of the dotted lines, which depresses the breaks, and causes them to bear with considerable force upon the peripheries of the naves, and by friction to stop them, or considerably impede their rotation.—[*Inrolled in the Inrolment Office, July,* 1830.]

As breaks have been employed commonly in this situation for impeding the rotation of a carriage wheel there is no novelty in their application, but the mode of bringing them into operation by a long lever, and rod placed behind the guard, may possibly be new, though without doubt it would be exceedingly inconvenient in that situation.

To William Palmer, *of Wilson-street, Finsbury-square, in the county of Middlesex, gentleman, for his having invented certain improvements in making candles.*—[Sealed 10th August, 1830.]

The object proposed by the Patentee is, to produce tallow candles which shall not require snuffing; that is, the wicks of which shall be completely consumed in the combustion of the other materials of which the candle is made.

There are two particular points in this invention; the first is, the combination of a chemical material with the matters composing the candles; and the second is, a peculiar manner of forming the wicks.

The chemical material employed is bismuth, in a finely divided state, which may be either made to adhere to the wick, or be mixed with the tallow, so as in either case to burn with the candle.

The bismuth which may be sub-nitrate, or any other preparation, is to be pounded, and finely granulated, and when that is done, it must be ground up with oil in the same way, that colours are usually prepared. This material is to be applied to the threads or yarns of cotton intended to form the wick, by means of a brush, which must be done by dabbing, rather than painting; and the cotton will be found to absorb the oil, while the bismuth will adhere to the external fibres of the thread.

In constructing the wicks, about one tenth of the whole quantity of cotton required, must be taken from the threads or yarns, prepared with the bismuth; these being placed with the other nine-tenths of ordinary yarns, are to be enclosed by them, and bound round in the manner called gimping. When so prepared, the wick yarn will have acquired a slight degree of stiffness, and having cut the yarn into pieces, equal to about twice the length of the intended candles, these pieces of yarn are to be severally twisted double round a rod or wire, the lower end of the rod having a notch at the botton, into which the yarn passed, for the purpose of preventing its slipping. The yarn thus twisted round the wire or rod in a double coil, resembling the *Caduceus of Mercury*, is with its rod to be inserted in the candle mould, and when the tallow in the mould has become set or hard, the rod may be drawn out at top, leaving the wick in the candle in the double coiled form described.

The same form of double coiled wick, prepared as above, may be used for dip candles also, as well as moulds, by passing a rod through the eyes or loops at top of the wires, and dipping the wicks into the tallow vat in the ordinary way of making dip candles.

The advantage of this improved candle is, that as the tallow becomes consumed the ends of the double wick will stand out sideways on each side of the flame, and the bismuth attached to the wick being acted upon by the oxygen of the atmosphere, will cause the wick to be completely consumed by the combustion, and therefore not require to be snuffed. The same effect will take place, though not so perfectly, in a single wick prepared with the bismuth, and if any superfluous quantity of bismuth should hang in globules about the wick, it will very soon be dissipated by evaporation.

An approximation to the same effect may be obtained by mixing granulated bismuth with the tallow in the proportion of about one drachm of bismuth to one pound of tallow. In candles made of this compound, when burning, the bismuth will deposit itself upon the wick, and cause its complete destruction by combustion, and require no snuffing as above said.—[*Inrolled in the Inrolment Office, February,* 1831.]

To JOHN HENRY CLIVE, *of Chell House, in the county of Stafford, Esq. for his having invented certain improvements in the construction of, and machinery for locomotive ploughs, harrows, and other machines for carriages.*—[Sealed 1st July, 1830.]

THE construction of a locomotive plough or harrow, as described in the title of the above Patent, led us to anticipate some very extraordinary and novel features of mechanical combination, but on perusing the specification, we find ourselves completely disappointed in our expectations, for as far as we can discover the Patentee's intentions, they are simply the adaptation of larger running wheels to locomotive carriages than have heretofore been employed,

There are no drawings appended to the specification, but from a long explanation of the Patentee's views, in which there is considerable repetition, we find he considers that the running wheels of locomotive carriages used upon rail roads have never exceeded five feet in diameter; now he proposes to employ larger wheels, that is, from five feet to ten feet diameter, and these he intends to drive by affixing the crank pin of the steam engine into one of the arms or side of the wheel at some distance from the axle; that is at more than fifteen inches from the centre of the wheel, which he considers to be the maximum length of any locomotive crank arm that has been heretofore employed in locomotive engines or railways. By these means a greater power of leverage is proposed to be obtained, and a greater speed.

The working cylinders of the engines will in this case require to have a longer stroke of piston, but the pistons used need not be larger in area.

For locomotive carriages to run upon ordinary roads, wheels of from six to twenty feet diameter, are proposed, the largest that the Patentee has heard of for carriages used on ordinary roads, being five feet six inches in diameter.

It is proposed to employ one broad wheel in the middle of the carriage which shall support the principal weight, and by this the carriage is to be guided by a long steering lever. The power of the engine or egines, for several are to be used in one carriage, being applied to each of the running wheels.

No particular mode is pointed out of adapting the proposed improvement to ploughs and harrows, but it is presumed that any competent engineer will see the best means of carrying the object into effect. We confess that we do not perceive either the novelty or the practicability of employing these improvements for the purposes of driving ploughs and harrows.

The Patentee states in conclusion, that the novelties which he claims to have invented are, first, the employment of larger running wheels than usual for locomotive carriages; second, the attachment of the crank pin to one of the arms, or to the side of the wheel further than usual from the axis; and third, the adaptation of a broad wheel in the middle of the carriage for driving and guiding.—[*Inrolled in the Inrollment Office, January,* 1831.]

Novel Inventions.

A VERY simple and ingenious philosophical apparatus for producing instantaneous light, on the principle of the match and bottle has just been imported from Paris, and made the subject of a Patent in this country granted to Mr. Newton, of the Office for Patents Chancery Lane, London.

The invention consists of two features. A peculiar construction of valve or stopper which prevents the escape of acid from the bottle and though remaining fixed at all times furnishing a sufficiet supply to produce the ignition of the match,

This valve or stopper is a leaden plug, screwed in the neck of a glass bottle, about two thirds filled with sulphuric acid. The plug is cup shaped on the upper surface, and convex below. One or more exceedingly small perforations are made through this plug for the passage of the acid from within, which is obtained by slightly shaking the bottle; when the drop or globule of the acid which adheres to the under side of the plug after the bottle has been shook, finds its way upwards through the small holes by capillary attraction, and which may be aided by the warmth of the hand expanding the air within, thereby assisting the liquid to exude into the cup above; the apertures however are too small to allow damp to enter.

The other feature of novelty is in the matches, which are made of short pieces of wax taper, the size of common dressing pins: on the end of which there is a small globule of mastic, made of an inflammable material, which instantly ignites on being introduced into the cup of the bottle stopper, and burns with a steady light for a minute or more, according to the length of the match.

The great merit of these matches consists in the smallness of the space they occupy: a dozen would go within a quill or pencil case; their durability while burning, and being free from any disagreeable sulphurous smell; indeed they may be made to emit an aromatic odour—and last, though not least, their extreme cheapness, as ten thousand may be made by means of machinery for less than one shilling, consequently they must inevitably supersede the ordinary wooden matches.

The apparatus are made in a great variety of tasteful forms and sizes; some have been introduced into pencil cases; the Patentee is constructing one of the bottles, with a supply of matches for travelling, in the small compass of a watch seal.

Patents granted in the United States of North America in the year 1831.

For a mode of Saving Water in Water Power; AARON FOOT, Williamstown, Berkshire county, Massachusetts.

THE patentee tells us that he claims the "applying to useful purposes, that momentum which water retains after passing from the principal, or common water wheel."

This it is proposed to do by applying a second water wheel, to be operated on by this *waste* water. The two wheels are to be geared together, by the intervention of cog wheels. The secondary wheel is to run more slowly than the principal, in the supposed proportion of the power of the two.

We recollect a similar project having been patented two or three years ago; and some of the water wheels which are in use, certainly appear as though they might be aided by such an appendage; we, however, are decidedly of opinion that in all well constructed wheels, it would be a waste of power to attempt to gain any from the waste water; and no one will commend the plan of constructing a main wheel badly, for the sake of applying a secondary.

If there is more *momentum* in the water, after it leaves the wheel than is necessary to carry itself off, the structure is bad; and if there is not, the secondary wheel may do much harm, but cannot be productive of any good.

For a Vertical Tooth Extractor; Ira W. Rutherford, Albany, Albany county, New York, January 4.

Numerous vertical extractors have been made, and every dentist of any eminence has tried them. There are cases in which they may be used with advantage, but so far as our information goes, those who have possessed the best instruments of the kind, have rarely employed them. In by far the greatest number of instances, a well constructed key, skilfully used, is the best. The extractor now proposed is ingeniously contrived, but although it differs in the construction of some of its parts from others made with the same intention, its general operation is the same. The tooth is to be embraced between claws, which are wedged together by forcing a piece between their upper ends by means of a thumb screw, on the main shaft of the instrument. A piece of India rubber, of soft wood, or of some other suitable substance, rests upon a sound tooth, or teeth, to operate as a fulcrum.

The patentee says, that "the advantages which it has over a newly mounted instrument, is, that it combines the lateral motion with the perpendicular." We do not know to what newly mounted instrument he alludes, but, whatever the individual may be, there are more than a dozen others variously constructed, and the question, of superiority, therefore, does not lie between it and one other instrument only, but between it and a number of competitors.

For an improvement in the mode of adjusting Metallic Plates to Artificial Teeth; Thomas R. Vanderslice, city of Philadelphia, January 3.

Instead of applying a metallic plate on the back part of the artificial tooth, in the usual manner, the tooth is to be moulded with a groove in the back part of it, into which the metallic plate will fit, and where it is to be secured by riveting or soldering to platina wires laid in their proper places in the groove at the time of forming the tooth.

There is to be a strip of bone, ivory, or other hard substance used to form the groove in moulding the tooth, and this is to be drilled to receive the wires. Neither this, or the manner of forming the groove, is represented by drawings, which certainly might have been done. We have repeatedly quoted the words of the patent law relating to this point, " and shall accompany the whole with drawings and written references, whenever the nature of the case admits of drawings."

For a Furnace for generating Steam for Culinary Purposes; Jesse Reed, Marshfield, Plymouth county, Massachusetts, January 5.

This furnace may be made of cast iron. It is to consist of two vertical, cylindrical vessels, one placed within the other, a space being left between their sides to contain water. The inner vessel is to form the fire place, the bottom of it is formed of bars, and upon them the fuel is to be placed, and is consequently surrounded by the double cylinders which contain the water. A close cover forms a steam tight connexion between these cylinders, and has in it perforations for steam pipes to lead into other vessels, and for a safety valve. Above the fire, there is a grate to sustain a kettle, or other vessel, in the manner of the common clay furnaces.

" The improvement in my said steamer, which I claim as new, consists of such additions of surrounding parts to the common clay or soap stone furnace now in use, as will enable me to arrest the portion of heat which in ordinary use, escapes through the side of the furnace, and with ti to boil the water which generates the steam for the purpose before-mentioned."

All this may be very intelligible to some folks, but such is not the case with us. We are at a loss to discover in what way the heat, which escapes through a clay, or soap stone, furnace, is to be saved, where neither of the materials are employed; and furthermore, we apprehend, putting both clay and soap stone out of the question, that this contrivance will not be found either very convenient or useful.

For an improvement in Thrashing Machines for thrashing all kinds of Chaff Grain; ISAAC NORTON, Saratoga, Saratoga county, New York, January 6.

THE beaters are to be placed upon four arms instead of upon a cylinder. The feeding apron is to be of slats of wood, the teeth are to be square and tapering, and from three-fourths to two inches long. There is to be a hollow segment supported by springs, and means are to be adopted for giving motion to the moving parts. There is no claim to novelty; the beaters, the wooden apron, the teeth, the segment, &c, being all very old, we therefore, greet and dismiss them with all the veneration which their antiquity inspires,

For an improvement in the manufacturing of Ropes; EDWARD S. TOWNSEND and PHILO DURFEE, Palmyra, Wayne county, New York, January 6.

THIS machine is composed of a shaft, or reel, used in place of a wheel or crank, to give the twist or turn for laying strands or rope; so that a strand or rope can be twisted or laid in certain lengths at a time, until a rope or strand is twisted or laid of any required length. The shaft to be fixed to revolve on proper supports, (in boxes, or gudgeons, &c.) made of proper materials, with a hole passing into the side and out at the end, so that when a rope or strand is coiled on the shaft, the end of it can pass through the eye thus made in the end of the shaft, not interfering with the supports; thus giving a chance for spinning to it another length of yarn; then the shaft being turned, gives the turn for the laying of strands or rope, which, when so laid, is again to be reeled, leaving the rope out as before: thus on-laying, and spinning, until any required length is finished. The chief object is to make a rope of any assignable length in one piece, by laying it in portions of convenient length, and spinning into the threads of the end of such parts as is already laid. In laying several ropes into a layer, or tarred yarn into a rope, the reels or machines must be equal to the number of strands and rope, and may remain stationary, or be placed on slides, or truck wheels, as may be necessary.

For a Machine for taking out stumps from land; ABIJAH GORHAM, Turner, Oxford county, Maine, January 7.

A WHEEL and axle is mounted so as to be drawn about upon truck wheels. From the middle of the axle a chain descends, which is to be fastened to the stump. Oxen are to draw upon another chain passing round the wheel, and thus the stumps are to be raised. We are not informed whether this machine is claimed wholly, or in part only; this would indicate that the patentee considers it is altogether new; but, according to information derived from other sources, we arrive at a very different conclusion.

Instead of the separate blocks usually employed, strips of mahogany, reduced to a proper width and thickness, are to be locked up in a common printer's chase. The same strips, under a different arrangement, serve for folio, quarto, octavo, 12mo. or 18mo. pages. Six of the strips are to be about three inches wide, and six to be about three-quarters of an inch. Upon these latter are the proper hooks or clasps, for retaining the plates. The particular construction of these strips and clasps are shown in drawings which accompany the specification. The wider, are called major, and the narrower, minor blocks. The claims are, to the particular plan of fashioning and arranging the blocks, so as to produce the effect intended. The using of fixed hooks attached to blocks, for the purpose explained in the specification: and the combination of the whole, in the manner set forth.

For a Machine for smoothing the Bodies of Printing Type. Invented by STEPHEN STURDEVANT, of the city of New York; assigned to ELIHU WHITE, of the same city, and patent issued to him, January 7,

" IN the place of the usual mode of smoothing the type by rubbing them under the fingers, on the flat surface of a grit-stone, I produce the same effect on them, by causing them to pass between two rotary blocks of metal, faced with steel, and having floats cut in the steel faces, to scrapet he type as they pass through."

The specification refers throughout to drawings which represent the machinery in a very distinct manner, and occupy considerable space. Without a view of the machinery, the claims could not be understood; they, however, are very clearly made out.

For a Machine for Casting Type, invented by MICHAEL D. MANN and STEPHEN STURDEVANT, both of the city of New York; assigned to ELIHU WHITE, of the same city, and patent issued to him, January 7.

THE remarks on the last patent apply with full force to the present. Judging from the drawings and description, the machine appears to have been devised with much skill; and every part of it is represented with great neatness and precision.

List of Patents

Granted by the French Government, from the 1*st of April, to the* 30*th of June.*

PATENTS FOR FIFTEEN YEARS.

To Brewin, Ambrose, of St. Quentin, represented by Mr. Perpigna, French and Foreign Patent Agent, 28, Rue Neuve St. Augustin, Paris, for an improved method of embroidering and ornamenting bobbing-net.

— Braithwaite, Isaac, represented by Mr. Perpigna, French and Foreign Patent Agent, for an improved inking apparatus.

— Sauvage, Frederic, of Boulogne, represented by Mr. Perpigna, French and Foreign Patent Agent, for a mechanical apparatus, acting as a substitute for paddle-wheels in steam vessels.

— Lucas, Jean Marie, of Rennes, for a new system of machinery for making pottery.

— Le Vicomte de Barris du Molarde, of Valence, for a volianic gluten.

— Berthault Ducreaux, Claude, Jean, Baptiste, Alexandre, engineer of Chalons, for a substance acting as a substitute for plaster of Paris.

— Malebouch, Jean, Thomas, Eugène, of Paris, for an improved method of using oil for illumination.

— Collier, John, engineer of Paris, for a machine for shearing ornamented shawls, called *de'coupeuse.*

PATENTS FOR TEN YEARS.

— Brunton, William, of London, represented by Mr. Perpigna, French and Foreign Patent Agent, for improvements in the mechanisms used for raising water and other purposes.

— Lippman, Lèon, of Paris, for a new fire box acting by means of inflammable air.

— Abbot, Peter, Harris, of London for rudders of a new construction.

— Goin, Quentin, François, of St. Quentin, for a mechanism to be adapted to that kind of bobbin-net frame, called *circular bolt system.*

To Lacheraudière, Alexandre, for improvements in lithographic printing.

— Lowe, George, of London, for improvements in the method of preparing gas for illumination.

— Laboureau, Philibert. Eugène, of Paris, for an improved method of making and preserving boots and shoes.

— Selligue, Alexandre, François, of Paris, for a new printing press, with an inking apparatus,

PATENTS FOR FIVE YEARS.

— Hammond, Charles, of Montpellier, represented by Mr. Perpigna, French and Foreign Patent Agent, for a new carriage with only one wheel, called *monocycle*.

— Rougevin, Jean, Joseph, architect, for an improved sewer.

— Odelant, junior, of Lille, for a new method of making Lille thread.

— Jacquand, Antoine, for a kind of blacking, called by him *leather preserving*.

— Pichon, François, mason, of Paris, for a new method of constructing vaults for privies.

— Doizy, François, of Paris, for an improved method of cleaning the vaults of privies.

— Grandin, Charles, León, lampmaker, of Paris, for an improved filtering coffee pot.

— Mercoiret, Antoine, Simon, of Lyons, for a mechanism applicable to the making of ribands.

— Parrizot, Etienne Jean, Jacques, of Paris, for a moveable cistern head.

— Garard, Jacques, Dominique, Charles, of Paris, for a new compass for making reductions.

— Pernot, Charles, Frederic, for an improved shuttle.

— Zeegler, and Cie, of Guelwiller, Bar Rhin, for a machine for dressing the warp.

— Zilges, Hewir, of Paris, for a mechanical process of circling wheels with iron.

— Darbo, junior, of Paris, for an improved sucking bottle.

— Doguet and son, braid manufacturers of St. Etienne, for improvements in the frames used for making braid.

— Ancey, Cesar, of Marseille, for a method of bleaching the pulp of paper.

To Brame, Chevalier, of Lille, for an improved distilling apparatus.

— Linarde, Antoine, of Paris, for a mechanical apparatus intended for public amusement.

— Martin, Joseph, Marie, for a new method of teaching orthography.

— Seguin, Pierre, François, boot maker, for a new kind of boots.

— Levelteer, Jean, Jacques, for improved window shutters.

— D'Anvers, Louis, for an apparatus, called *sudatorium*.

— Deleuqe, and Bailly, of Lyons, for an improved winder for silks.

— Werly, Jean, of Bar-le-Duc, for a new kind of tissue used to make stays without seams.

— Raspard, Mathieu, of Lyons, for an improved water closet.

— Deleuil, Joseph, Louis, for an improved syringe.

— Grus, Alphonse, Jean, piano tuner of Paris, for improvements in the construction of pianos.

PATENTS FOR ADDITIONS AND IMPROVEMENTS MADE BY THE PATENTEES.

— Perry, James, of London, represented by Mr. Perpigna, French and Foreign Patent Agent, for improvements on his metallic pen, called *plume de Perry*.

— Verguet, Jean, Alexis, of Carcassonne, for improvements on his mill, with fluted cylinders, to be used in breweries.

— Merkel, George, Etienne, of Paris, for improvements on his fire box, called *phlogosaïde*.

— Guil'al and Rathier, of Paris, for improvements on their method of cutting caoutchouc into threads.

— Perrin and Vernois, for improvements on their mechanical process called *autopiese*.

— Manese, Mallet, and Co, of Valenciennes, for improvements on their method of cutting nails without loss of substance.

— Pouillot, Jean, Jérénire, for improvements on his method of manufacturing compound fuel, To Jaillet, junior, of Lyons, for improvements on his frame for making ornamented tissues.

— Reneu, Urbain, Nicolas, of Paris, for improvements on his method of tanning rabit skins.

— Revellon, Thomas, for improvements on his machine for receiving the pressure of fluids, and obtaining thereby a power.

— Fleulard, Louis, Edouard, for addition to his grinding machine, called *pantritor*.

— Chauvin and Chabot, for additions to their improved method of loading muskets and fowling pieces.

— Thomas Payen, Barth and Co. for improvement on his new system of springs for carriages.

— Betoulle, Martial, improvement on his instrument for measuring distances.

— Large, Benoist, engineer, third improvement on his boilers for steam engines.

— Pepin, Pierre, Theodore, Florentin, improvement on his mills for removing the husks of corn, and dry seeds.

— Cordier Lalande, Jacques Philippe, improvement on his oleostatic lamp.

— Maelzel, Jean, engineer, improvemint on his instrument called *motroname*.

— Souchon, Jean, Marie, improvement on his method of dying with prussiate of iron, and other substances,

— Galy Cazalat, Antoine, improvement on his new steam engines.

— Frompette, Andre Etienne, improvement on his method of hanging the bodies of cabriolets.

New Patents

GRANTED IN ENGLAND IN 1832.

To John Jacob Parker, late of Sheffield, but now of Birmingham, in the county of Warwick, gentleman, for his having invented or found out a certain improvement or improvements in fountain pens.—Sealed 26th July.—6 months, for inrolment.

To Pierre Nicolas Hainsselin, of Duke-street, Saint James's, in the county of Middlesex, architect and engraver, for his having invented a machine or motive power, for giving motive power.—26th July.—6 months.

To William Evatt Wright, of Regent-street, in the parish of Saint George, Hanover-square, in the city of Westminster, gentleman, for his having invented or discovered certain improvements in the construction, making, or manufacturing of tea or coffee urns, and other utensils of that description.—4th August.—6 months.

To John Christophers, of New Broad-street, in the city of London, merchant, for his invention of an improvement or improvements in clothes buttons.—4th August.—6 months.

To Benjamin Cowle Tyzach, Thomas Storer Dobinson, and John Robinson, all of North Shields, for their invention of certain improvements in windlasses, or machinery for winding up the cable, which they denominate Tyzach, Dobinson, and Co's. compound lever windlass.—4th August.—2 months.

To Joseph Crawhall, of the town and county of Newcastle-upon-Tyne, rope maker, for his invention of an improvement in the manufacture of flat rope, such as is used in mines,—extending to all the colonies and plantations abroad.—8th August.—2 months.

To William Newton, of the Office for Patents, Chancery Lane, in the county of Middlesex, civil engineer and mechanical draftsman, for an invention communicated to him by a Foreigner residing abroad, for an improved apparatus for producing instantaneous light, and the means and mechanism to be employed in the manufacture of the same—extending to the colonies and plantations abroad. —10th August.—6 months.

To Thomas Wells Ingram, of Birmingham, die-sinker, for his invention of an improved method of manufacturing a certain description of buttons, by the application of machinery, not used heretofore for that purpose.—15th August.—6 months.

To William Henry James, of Thaives' Inn, Holborn, in the city of London, engineer, for his invention of certain improvements in the construction of steam carriages, and the apparatus or machinery for propelling the same, part of which improvements are applicable to other purposes. —15th August.—6 months.

TIDES.

Remarkable high tides may be expected about the 26th or 27th of this Month, that may cause accident on our Southern Coast, if aided by particular winds.

CELESTIAL PHENOMENA, FOR SEPTEMBER, 1832.

D.	H.	M.	
1	0	0	Clock after the ☉ 13 sec.
1	0	0	☉ rises 5h. 15. sets 6 h. 45 m.
1	0	0	Vesta R. A. 12 h. 0 m. dec. 5°. 27. N.
1	0	0	Juno R. A. 12 h. 12 m. dec. 2. 10. N.
1	0	0	Pallas R. A. 23 h. 58 m. dec. 0. 29. S.
1	0	0	Ceres R. A. 3 h. 4 m. dec. 6. 14. N.
1	5	33	☽ passes the meridian
2	1	31	☽ in □ or first quarter.
3	13	14	♃'s second satellite will immerge.
4	0	26	☿ passes the meridian.
4	0	0	Occultation • in Sagett, im. 7 h. 35 m. em. 8 h. 58 m.
5	0	0	Clock after the ☉ 1 m. 30 s.
5	3	0	☽ in Apogee.
5	0	0	☉ rises 5 h. 22 m. sets 6 h. 38 m.
6	9	36	☽ passes the meridian.
6	10	40	Jupiter's third sat. will immerge.
6	12	50	Jupiter's first sat. will immerge.
7	0	6	☿ passes meridian.
7	0	45	♀ passes the meridian.
7	16	44	♂ passes the meridian.
7	12	37	♃ passes the meridian.
7	0	15	♄ passes the meridian.
10	5	33	Ecliptic opposition or ○ full moon.
10	0	0	Clock after the ☉ 3 m. 12 sec.
2	6	50	☽ in conj. with ♃ long. 23. in Pisces, ☽ lat. 4. 0. S. ♃ lat. 1. 35. S. diff. of lat. 2. 25.
10	0	0	☉ rises 5 h. 32 m. sets 6 h. 28 m.
10	15	50	Jupiter's second sat. will immerge.
13	0	0	Occultation ξ in Ceti, im. 9 h. 28 m. em 10 h. 21 m.
13	14	42	Jupiter's third satellite will immerge.
14	3	0	☽ passes the meridian.
15	9	13	Jupiter's first sat. will immerge
15	0	0	Clock after the ☉ 4 m. 57 sec.
15	0	0	☉ rises 5 h. 42 m. sets 6 h. 18. m.
15	10	51	☽ in conj. with ♂ long. 3. in Taurus, ☽ lat. 4. 24. S. ♂ lat. 1 43. S. diff. of lat. 2. 41.
15	13	41	Jupiter's fourth sat. will immerge.
17	0	0	☿ stationary.
17	0	0	Vesta R. A. 12 h. 30 m. dec. 2. 12. N.
17	0	0	Juno R. A. 12 h. 34 m. dec. 0. 15. N.
17	0	0	Pallas R. A. 23 h. 47 m. dec. 4. 12. S.
17	0	0	Ceres R. A. 3 h. 6 m. dec. 5. 52. N.
17	1	45	☾ in □ or last quarter.
20	0	0	☉ rises 5 h. 51 min. sets 6 h. 9 min.
20	0	0	Clock after the ☉ 6 m. 42 sec.
20	8	36	☽ passes the meridian.
20	23	30	☽ in Perigee.
21	10	25	Jupiter's second sat. will immerge.
22	11	38	☽ in conj. with ☿ long. 12. in Virgo. ☽ lat. 3. 19. N. ☿ lat. 31. N. diff. of lat. 2. 48.
22	13	39	☉ enters Libra.
22	13	22	Jupiter's first sat. will immerge
24	7	8	Ecliptic conj. ● or new moon.
24	7	50	Jupiter's first sat. will immerge.
24	0	0	☿ in perihelio.
25	0	0	☉ rises 6 h. 1 m. sets 5 h. 59 m.
25	0	0	Clock after the ☉ 8 m. 25 s.
25	1	2	☽ in conj with ♀ long. 18. in Libra, ☽ lat. 4. 56. N. ♀ lat. 50. N. diff. of lat. 4. 6.
28	13	1	Jupiter's second sat. will immerge
29	15	17	Jupiter's first sat. will immerge.
29	22	0	☿ in conj. with ♄ diff. of dec. 9.
30	0	0	Clock after ☉ 10 m. 4 s.
30	0	0	☉ rises 6 h. 11 m. sets. 5 h. 49 m.
30	5	31	☽ passes the meridian.

Mercury may be seen a little before the Sun rises on the 24th.

Jupiter will be in a favourable situation for observation during the whole of this Month.

J. LEWTHWAITE, Rotherhithe

METEROLOGICAL JOURNAL,

For July and August, 1832.

1832.	Thermo.		Barometer.		Rain ininches.	1832.	Thermo.		Barometer.		Rain in inches
	Hig.	Low	Hig.	Low			Hig.	Low	Hig.	Low.	
JULY 26	71	50	30,12	Stat.		AUG. 11	77	54	30,19	30,15	
27	71	49	30,14	30,08		12	79	50	30,17	30,02	
28	70	50	30,30	30,17		13	76	45	29,95	29,89	
29	71	51	30,35	30,29		14	76	47	29,85	29,94	
30	73	43	30,34	30,30		15	73	53	29,86	29,84	
31	73	42	30,22	30,14		16	77	50	29,98	29,90	
AUG. 1	71	44	30,07	30,01		17	74	49	30,10	30,04	
2	77	52	29,84	29,79		18	71	47	30,00	29,90	
3	70	56	29,84	29,80		19	71	48	29,79	29,73	
4	67	46	29,86	29,82		20	73	47	29,99	29,96	,025
5	65	49	29,86	29,82	,4	21	71	47	29,87	29,76	
6	67	48	29,85	29,82	,375	22	69	52	29,73	29,62	,275
7	73	53	29,91	29,86		23	63	47	29,85	29,77	,05
8	75	45	30,02	29,96		24	67	43	29,99	29,93	,025
9	79	49	30,08	Stat.		25	62	47	29,89	39,78	,05
10	81	53	30,13	30,05							

The generally favourable weather of the present month, has enabled the farmer to secure with much ease, a more productive harvest than has been for many years.

From 10 till half-past 11 in the evening of the 22nd, a steady Northern light, from which coruscations proceeded for a few minutes before and after 11, darting up to a height of about thirty degrees.

Meteors are nightly to be seen, especially near the zenith darting in almost every direction.

Edmonton. CHARLES HENRY ADAMS.

Latitude 51° 37 32 N.
Longitude 3 51 West of Greenwich.

THE

London
JOURNAL OF ARTS AND SCIENCES,

AND

REPERTORY
OF
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No. VI.
(CONJOINED SERIES.)

Recent Patents.

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To Edward Newman Fourdrinier, *of Henley, in the parish of Stoke-upon-Trent, in the county of Stafford, paper-maker, for his having invented a certain machine for an improved mode of cutting paper.*—[Sealed 6th June, 1831.]

The invention which forms the subject of this Patent, applies to that kind of machinery by which paper is made in a perpetual length. The inconvenience and difficulty of cutting the paper so made, into small sheets by hand, has caused many contrivances to be proposed for that purpose;—for instance, the invention for which a Patent was granted to Edward Cowper, March, 1828, (see the

Eighth Vol. of our Second Series, page 20.) The present Patent is for a mechanism to perform this operation with expedition and precision; and is described in the following words:—

My invention consists in a combination or arrangement of apparatus or machinery, and thus producing a machine, by which an improved mode of conveying lengths of paper from the reel, to receive the transverse cut is obtained; and at the same time the machine is capable, by a simple adjustment, to cut the lengths of paper into the required sizes.

Paper making machines are generally constructed to make the lengths of paper of a sufficient width, so that when severed by longitudinal cuts, they will each form one, two, or more lengths of paper, ready to be divided by transverse cuts into sheets. My invention is a machine for conducting such lengths of paper, either single or if more than one, placed one upon the other to receive the transverse cut as hereafter fully described; and I prefer the longitudinal cuts to be made prior to the reels which carry the lengths of paper being put into the machine.

Plate XII, represents my machine in different views; fig. 1, is an elevation, taken on one side of the machine; and fig. 2, is a longitudinal section of the same, the several letters referring to similar parts in these two figures; *a, a, a, a,* are four reels, each having one length of paper wound round; they are respectively supported on bearings in the frame work *b, b, b*; *c, c, c,* is an endless web of cloth, felting, or other suitable fabric, passed over rollers *d, d, d, d,* which web is kept in close contact with the under side of the drum *e, e.*

The lengths of paper to be operated upon, are passed between the drum *e,* and the endless web *c,* as shewn in the figures; and on motion being given to the machine by a band or strap, or by geering, communicating from any first mover to a rigger fixed on the driving shaft *f*, the paper will be drawn off the reels, and fed into the machine.

But, as it is necessary that the progress of the paper forward should be stopped, during the time that the transverse cut takes place, that stopping is effected by the following means:—

On the shaft *f*, is fixed the crank plate *g*, (see fig. 1,) which carries the pin or stud of the crank. This pin is set in an adjustable sliding piece *i*, which may be fixed by a screw in the graduated groove, upon the face of the plate *g*, and thereby, the throw of the crank made greater or less as may be required. The crank pin is connected by its rod *j*, to the oscillating segment rack *k*, (suspended from its fulcrum above), which takes into the toothed wheel *l*, turning loosely upon the axle of the drum *e*, *e*; upon this toothed wheel *l*, the arms *m*, *m*, are mounted, carrying one or more palls *n*, which take into the teeth of the ratchet or toothed wheel *o*, *o*, fixed upon the axle of the drum.

As the crank and its plate *g*, revolve in the direction of the arrows, the segment rack *k*, will be made to oscillate, in doing which, it will give a reciprocating rotary motion to the toothed wheel *l*, and that will cause the arms *m*,*m*, carrying the pall *n*, to vibrate. The pall in receding, slides over the periphery of the ratchet wheel, but in advancing as the arrow points, it takes into the teeth of the ratchet, and drives it and the drum round part of a revolution, and the friction of the drum and the endless web, by these means, draws from off the reels into the machine at intervals, such lengths of paper as may be required to be cut off into single sheets; the knife being intended to cut through the paper transversely at the time that the segment rack is receding, that is, where the paper is not advancing.

It may here be stated, that according as the crank pin in the sliding piece *i*, is fixed nearer to, or further from the centre of the shaft *f*, the distance through which the crank passes in revolving, will be increased or diminished; and the drum *e*, will, by that means, be made to perform more or less of a revolution at each movement, and consequently draw into the machine greater or less lengths of the paper; this adjustment is for the purpose of enabling the machine to cut the paper into sheets of different sizes.

The lengths of paper having by these means been carried forward over the bed *r*, of the cutting knife, (which has a fixed blade, seen best in the section fig. 2), the wiper or lifter *s*, on the rotary shaft *f*, will raise the tail of the lever *t*, which causing the other end with the knife *u*, *u*, fixed transversely upon it to be depressed (as shewn in the detached fig. 4), the two edges act as shears, and cut through the paper crosswise.

But, before the knife *u*, begins to operate, the transverse fall board *v*, will be allowed to descend by its own gravity, and its edge to press and hold the paper upon the bed *r*, during the time the knife is cutting, this fall board *v*, is suspended by cords or straps passing over pulleys from the arm *y*, fixed to the lever.

As soon as the lifter has passed away from the tail of the lever *t*, the weight *z*, suspended from it will cause the knife and the fall board to be drawn up out of the way of the advancing length of paper, which will be brought forward immediately by the movement of the drum *e*, as before described.

The knife or cutter is not placed parallel to it axis, but at an angle thereto, and is curved, to bring the edges against that of the fixed blade.

The knife or cutter need not be fixed upon the ends of levers, but may be placed between two guide pieces, and have the necessary motion given to it by levers, or otherwise, as will be hereinafter described.

Fig. 3, shows a slight variation in the fixing of the rod *j*, which is connected directly to the rack *k*, and in this figure I have only represented one reel placed in the machine, in order to show that the machine is capable of receiving one or more reels; and I have also represented this figure to show that the knife *u*, may be guided between two pieces, instead of its being placed at an angle to its axis as before described; but in every other particular the machine is the same, and the corresponding letters of reference indicate similar parts.

Although I have in this my specification, described parts which are not new, and may have been before used in paper cutting machines, I wish it to be understood, that I do not claim such parts as of my invention; but I do claim the particular mode of drawing, leading, or feeding into the machine the length or lengths of paper to be operated upon, by means of the crank and its connecting rod, the oscillating segment rack and its toothed wheel and palls, with the ratchet or toothed wheel drum, and endless web as herein described; and also the manner or mode of adjusting the length of the crank, and consequently the length of the sheet of paper intended to be cut off, by the peculiar construction of the crank plate, guides, adjustable pin or stud, and slider, as also hereinbefore particularly explained; and, lastly, the general arrangement, combination and construction of the parts, or the mechanism forming "a machine for an improved mode of cutting paper."—[*Inrolled in the Rolls Chapel Office, December,* 1831.]

Specification drawn by Messrs. Newton & Berry.

To George Solomans *and* Elias Solomans, *of Bedford-square, in the parish of Stepney, and county of Middlesex, opticians, in consequence of a communication made to them by a certain foreigner residing abroad, for an invention of improvements in preparing certain transparent substances for spectacles, and other purposes.*—[Sealed 16th February, 1832.]

The whole matter of this invention may be told in one word—the construction of lenses of *amber* instead of glass.

The amber is to be carefully selected, and those pieces taken, which appear to be most transparent and free from specks; they are then to be cut into such dimensions and forms as may be best suited to the lenses intended to be made, and after having been reduced by filing nearly to the proposed figure, each lens is to be ground in the same way and with the same sort of apparatus that glass lenses are prepared by the ordinary process; and in polishing these lenses, putty powder is to be employed with spirits of wine.

The Patentees have not mentioned any advantages which spectacles possess made with amber lenses; we are therefore unable to point out the merits, if any, of this invention.—[*Inrolled in the Inrolment Office, August,* 1832.]

To George Vaughan Palmer, *of the parish of St. Swithin's, Worcester, artist, for certain improvements in machinery, or apparatus for excavating, and which is called an excavating and self-loading cart.*—[Sealed 24th January, 1832.]

The Patentee states in his specification of the above invention, that his excavating and self-loading cart may be worked by horse or other power, and that he excavates by ploughing instruments connected to the body of the cart or carriage under command of cranks and levers which loads itself by means of its own wheels, and receive and convey the soil into its own body, being expressly adapted to answer the double purpose of travelling on roads as other cart or carriage wheels, and as earth lifters. The general construction of this cart or carriage bears a close resemblance to others. The tire of the wheel has a smooth surface on the exterior to travel on roads, but the interior part differs from all others in its construction being hollow, and adapted to receive and lift earth or soil, and has a fence or flange on each side, subdivided by compartments or partitions acting as earth lifters, the earth being received from an excavating instrument connected to the cart or carriage body on the interior part of the wheel's tire between the partitions or earth lifters, and in the wheel's progress in travelling on the surface of the earth, the earth lifter conveys it upwards over the wheel's centre, and as each partition in succession becomes inverted, delivers the earth or soil into the body of the cart.

This cart also differs from others in the application of an excavating instrument connected to it for the purpose of excavating and supplying the wheel or lifters with earth, it being adapted to receive earth or soil as it travels on the earth's surface.

In Plate XII, fig. 5, is a sort of perspective or side view of one of these self-loading carts. Fig 6, is a plan view of the same; and fig. 7, is a view of the back; *a,a,* is the line of the wheel, with a flange on each of its sides; *c,* is the excavator. The wheel next the excavator is not so broad as the opposite one, in order that the earth or soil may more easily pass over it, to supply the wheel with earth, which is turned into it by the excavator; *d, d,* are partitions or earth lifters, which subdivide the tire of the wheel, are made fast to it, and to each flange *b,* and project from the interior part of the tire towards the centre of the wheel. The number of these partitions required, depends on the size of the wheel, and the work it has to perform. The excavating instrument *c,* in its exterior form bears a close resemblance to a plough, and may be made to act on either side, or behind the wheels. If it be adapted to act behind the wheel, an open space must be made to admit the earth to pass under the wheel. Figs. 5, and 6, represent the excavating instrument placed so as to act on the outside of each wheel; *e,* is the body of the cart; *f,* the shafts; *g, g,* the projecting side of the cart body, over which the tire and flanges of the wheel project.

The tire, flanges, and partitions, of the wheels may be cast in iron altogether, but it can be made in wrought iron by riveting and screwing the various parts together.

The excavator is made fast to a beam *h,* by bolts; *i,* is a lever connected to the shaft *j*; at the head of the cart *k, k,* are cranks upon the end of the shaft *j,* connected to the beam *h,*; on the lever *i,* being raised or lowered, the excavators will be put into, or out of action.

The bottom of the cart is formed by two flaps or folding doors, for the purpose of more easily unloading the cart; *l, l,* are projecting pieces made fast to the body of the cart; *m, m,* the folding doors, which when closed, form the bottom of the cart *n,* is the axletree; *o,* chains connected to the folding doors and to the rod *p,* on which the chains *o,* are wound and unwound by a winch handle *q,* attached to the rod *p,* and *r*, is a ratchet wheel attached to the rod *p*, by which the doors are kept closed.

Fig. 7, shews the wheel with the tire removed; *d*, the earth lifters, or partitions; *b*, *b*, its two flanges; fig. 8, is a section of the wheel, shewing the appearance of the partitions or earth lifters; *s*, *s* the spokes; *t*, the nave; fig. 9, represents the cart in positions to begin working by horse power. The lever *i*, being down, on the cart being pulled forward, the excavators pierce the earth without any assistance from the driver, and on excavating and turning the earth into the recesses of the wheel, the partitions or earth lifters convey it upwards, and delivers it above the wheel's centre into the cart or carriage body. Each partition or earth lifter in succession becomes inverted until the cart is loaded, when the excavator can be lifted above the earth's surface by means of the lever *i*, and thereby put out of action; the cart can then travel on any road to its place of delivery as any other cart; *a*, is a chain which is made fast at one end to the excavator *c*; the other end is attached to the head of the cart at *v*. By shortening or lengthening the chain between the excavator and the head of the cart, the excavator can be adjusted to the depth of earth, soil, &c. required to be removed, the crank *k*, being stopped when descending on any part of its circle in proportion to the length of the chain.

The cart is unloaded from the bottom, it being formed of two folding doors *m*, *m*, as before stated, which are opened and closed by a chain *o*, wound and unwound round the rod *p*, by turning the winch handle *q*. When the doors are closed, they may be made fast by placing the stopper *w*, between the teeth of the ratchet wheel *r*. Some kind of work to be performed by this cart may require a third wheel to be placed in front of it, or a wheel before each excavator attached to the beam *h*, which may be omitted or added as they are required for the purpose, so as to take a part of the weight off the horse's back

The Patentee states, in conclusion, that his "invention or improvements in carts or carriages consist in the new application of a cart or carriage wheel to receive and lift earth or soil, and convey it into its own carriage body whilst travelling on the earth's surface, and in adapting an excavating instrument to a cart or carriage to supply its wheel with earth, which wheel delivers the earth into its own carriage body."—[*Inrolled in the Inrolment Office, July*, 1832.]

To ELIJAH GALLOWAY, *of Carter-street, Walworth, in the county of Surrey, engineer, for certain improvements in paddle wheels.*—[Sealed 17th May, 1832.]

THE Patentee states in his specification, that his invention consists in constructing paddle wheels on two axes or shafts, they being set at an angle to each other, whereby the float boards or paddles, which are set at an angle to to their respective axes, are made to approach each other as they enter the water, and come into action for propelling, and at the same time those paddles or float boards, which are going out of action recede from each other, and permit the water to pass between them, the paddles leaving the water edgewise.

Plate XII, fig. 10, is an edge view of two paddle wheels, placed on two axes set at an angle to each other, and fig. 11, shews the universal joint separately, which connects the shafts or axes of the paddle wheels; *a,* and *b,* are the two paddle wheels. The axes or shafts *c,* of the wheel *a,* turns in bearings affixed on the beam, running from end to end of the paddle box, and the shaft of axes *d,* of the wheel *b,* turns in bearings affixed to the beam *f, f,* also running from end to end of the paddle box.

The Patentee has not thought it necessary to shew in the drawings, any part of the vessel to which these paddle wheels are to be affixed, there being no variation from those already in use excepting the additional beams *f, f,* which carry the second wheel *b.* The main shaft *c,* which carries the wheel *a,* is that which receives motion from the engine or first mover, and such motion is communicated to the axes or shaft *d,* by means of the universal joint which connects the shaft *c,* and *d,* and thus are the wheels *a,* and *b,* caused to turn in the same direction, and there being the same number of paddles or float boards on each of the paddle wheels, and their edges being opposite each other, when at the lowest point of the circle, the revolution of the wheel causes the corresponding edges of the paddles or float boards on the wheels *a,* and *b,* to approach each other as they enter the water, and form two sides of a triangle, which hold the whole or greater portion of the water during the time they are in a condition to give a beneficial propelling action; but when they would tend to lift the water (commonly called the "back water") the float boards recede from each other, and permit the water to pass between them, and they of course at the same time leave the water in a feathered or edgewise position, by being so fixed on the arms of the wheel.

The paddle wheels *a,* and *b,* are strongly affixed to their respective shafts, in a similar manner to those already in use in steam boats; and the construction of the paddle wheels varies only from those most generally used, inasmuch as the paddles or float boards are set at an angle to their respective axes or shafts; and the angle which the Patentee prefers for setting the paddles or float boards, and also the angle for setting the shafts or axes *c*, and *d*, will be seen in the figure, although he does not confine himself to those angles, as the same may be varied without departing from this invention.

Fig. 11, shews the universal joint separately, by which its action will be readily understood, and consequently the means of producing rotary motion to the shaft *d*, from the shaft *c*, and a simultaneous action to the paddle wheels *a*, and *b*. The connection or universal joint consists of the arms or cross *i*, *i*, which are keyed to the end of the axes or shaft, which carries the wheel *b*, and by means of the connecting pieces or links *j*, *j*, which are connected, (but allowed to turn) to the shaft *c*, by the pins *k*, *k*, which pass through the connecting piece *j*, *j*, at *k*, *k*, and the connected pieces *j*, *j*, are connected to the arms *i*, *i*, by the upper part of that arm passing through the pieces *j*, *j*, at *l*, *l*, as shewn in the figure. By this means whatever motion is communicated to the axes or shafts *c*, will at the same time be communicated to the shaft or axes *d*, and the two wheels will revolve in the same direction, and the edges of the corresponding float boards or paddles on the two wheels, will be brought to approach each other as they enter the water, and recede from each other as they leave the water, as above described, and thus each pair of corresponding float boards when they are brought edge to edge, act as one float board, and hold the water to produce the propelling action; and afterwards as they go out of action, by receding from each other permit the water to pass between them, and come out edgewise, thus producing a feathering action as above described.

The Patentee observes, in conclusion, that he is aware that paddle wheels having the float boards, or paddles curved and set at an angle to the axis or shaft, have been before used, he does not therefore lay any claim as a novel invention in usuing such paddle wheels, but states that his invention consists in applying two such paddle wheels on two axes or shafts set at an angle to each other, whereby the edges of the float boards or paddles are made to approach each other in coming into action for propelling, and are caused to recede from each other as they go out of action, for the purpose of permitting the water to pass between them as above described.—[*Inrolled in the Inrolment Office, Jan.* 1832.]

To RICHARD ATKINSON, *of Huddersfield, in the county of York, woollen cloth manufacturer, for his invention of an improved machine or method for raising or brushing woollen cloths and other goods.*—[Sealed Feb. 16th, 1832.]

IN this improved machine for raising or brushing woollen cloths (which is of the class of machinery called a gig mill, on the ordinary Yorkshire construction) the teasle boards or frames, or boards of cards, or of brushes, are attached to the gig barrel by a peculiar mode or method of fastening, which enables the Patentee to introduce springs between the teasle frames, or boards of cards, or brushes and the working barrel, and thereby to allow a degree of elasticity to their operation when acting upon the surface of the cloth in raising the pile or brushing the nap. And this machine when so improved, affords the means of dressing woollen cloths and other goods by a much more effective method (viz. by an elastic raiser or brush) than can be obtained by any of the gig mills or dressing machines in which the teasles, cards, or brushes are firmly fixed to the revolving barrel.

In plate XIII, fig. 1, exhibits a front elevation, and fig. 2, a section taken transversely of a gig mill with these improvements adapted thereto, but in which several of the teasle boards, card boards, or brushes are removed for the purpose of shewing the springs that are to act beneath them. Fig. 3, represents one of the boards attached to the barrel upon an enlarged scale; the same letters referring to the corresponding parts in all the figures; *a, a, a,* is the ordinary barrel or cylinder of the gig *b, b, b,* thin pieces of steel or other fit material which are affixed by screws or other means to the barrel, and are bent upwards to constitute springs that shall support the teasle boards, card boards, or brushes when mounted on the barrel; *c, c,* are pillars or pins of iron set into the barrel near each end, standing radially, and fastened by screw-nuts at the under part, or secured by any other suitable means; *d,* is the teasle board, card board, or brush, which is mounted on the barrel by passing the pins or pillars *c, c,* through the holes near the ends of the board, such holes being lined with brass or brass bushes, and the boards are secured to the pillar by screwed nuts *e, e.*

The pillars are made something smaller than the holes in the ends of the board, and thereby the board is enabled to move up and down readily, but being supported on the under side by the springs *b, b,* it is held up close to the nuts, as shown at fig. 3, unless pressed upon by any force on the upper side. As the general construction of a gig mill and the manner in which the teasles, cards, or brushes act upon the face of the cloth in raising or dressing the pile is so well understood, it is scarcely necessary to say that the cloth as it passes through the machine pressess by its tension with considerable force against the teasles, cards, or brushes placed round the barrel, and by the rigidity of action the cloth frequently becomes injured. It will however be perceived, that in this improved machine the boards which carry the teasles, cards, or brushes being raised up some distance from the periphery of the barrel, and supported on springs, that pressure which is caused by the tension of the cloth as the gig barrel goes round, is relieved by the elasticity of the bearings on which the boards are mounted, and that any injury which the cloth might be liable to receive is thereby prevented. And further, that by this method of dressing the cloth by elastic boards of teasles, cards, or brushes, a more perfect raising of the pile is effected, and a much softer nap produced. In conclusion, the Patentee wishes it to be understood that although he has represented as in the figures springs for supporting the boards bent into a particular form, and placed in a particular way upon the barrel of the gig, yet he does not intend to confine himself precisely thereto, as helical springs placed round the pillars under the ends of the boards, or springs of various forms placed between the barrel and the teasle boards, might answer the purpose equally well; he therefore declares that his invention consists in the introduction of springs under the boards or frames of teasles, cards, or brushes, attached to a gig machine for raising and dressing woollen cloths and other goods, and he does not intend to confine himself to any particular form or construction of dressing machines to which the same may be adapted, as the contrivance is equally applicable, both to the first process of raising the pile of the cloth by teasles or cards, and to the last process of dressing or laying the nap by rotary brushes.—[*Inrolled at the Rolls Chapel Office, August*, 1832.]

Specification drawn by Messrs. Newton and Berry.

To SAMUEL WALKER, *of Millshaw, near Leeds, in the county of York, clothier, for his invention of certain improvements in gig machines for dressing woollen cloths.*—[Sealed March 1st, 1832.]

THESE improvements in gig machines for dressing woollen cloths consist in the novel arrangement of the rollers and the parts connected thereto, that carry and conduct the cloth over the teasle cylinder, by which the cloth is kept properly distended and even, during the operation of raising the pile. In Plate XIII, fig. 4, is an end elevation of a gig upon this improved plan; fig. 5, is a section of the same; and fig. 6, is an elevation of the reversed end of the machine; and in which the positions of the teasle cylinder and the several rollers are seen, and the toothed wheels and other appendages by which they are driven; *a*, is the large gig barrel, or teasle cylinder, in which teasles, cards or brushes may be placed, and to which rotary motion may be given in the ordinary way, or by any other means which may be found eligible; *b*, is the roller upon which it may be supposed that the cloth has been in the first instance rolled or wound; *c*, is a similar roller driven by gear attached to the end of its axle, the periphery of the roller *b*, or of the cloth which is rolled upon it always bearing upon the periphery of this roller *c*, and consequently turned by the friction of contact; *d,* is another roller, on to which the cloth is intended to be rolled as it is drawn from the roller *b*; *e,* is a similar roller to *c,* driven by gear at the end of its axle, which by friction turns the roller *d,* that bears upon it. The tension roller *f,* has its axle mounted in the segment racks *g,* as usual, and it is raised or depressed by turning the shaft and pinion *h, h.*

The roller *b,* with the cloth upon it being mounted in the machine, as shewn, the end of the cloth is brought round and under the roller *c,* and the tension roller *f,* and is then conducted over the roller *e,* and made fast to the roller *d,* by its forel and canvas, and the surface of the cloth is made to bear upon the periphery of the teasle cylinder to any extent, more or less, as may be required, by raising or depressing the tension roller.

In order to put the gig in action, rotary motion is given to the teasle cylinder by toothed gear, a clutch box locking it to the power shaft *i,* as shewn in the figure; a pinion fixed on the shaft of the teasle cylinder takes into a carryer wheel *k,* which drives the loose wheel *l,* on the axle of the roller *c,* and this wheel takes into, and drives a similar loose wheel *m,* on the axle of the roller *e.* Now by locking the clutch to the wheel *m,* on the axle of the roller *e,* the roller *d,* will be made to revolve, and to draw the cloth from the roller *b,* under the roller *c,* over the surface of the gig cylinder under the tension roller *f,* up to the roller *e,* when it rolls or winds upon the roller *d,* until all the cloth has been drawn from the roller *b,* upon which it was first rolled. In order to take the cloth back again through the machine for the purpose of being further operated upon by the teasles, the clutch must be unlocked from the wheel *m,* so as to allow that wheel to turn freely upon its axis, and the clutch of the wheel *l,* be projected, in order to lock that wheel to its axle. The roller *c*, will now be driven round by the toothed gear, and cause the roller *b*, to turn also, and to take up or wind on the cloth in the same way as roller *d*, above described.

This alternation of the cloth from the roller *b*, to *d*, and from *d*, to *b*, may be continued until the pile of the cloth has been sufficiently raised, and in order to keep the cloth always at a suitable tenison, a pulley and break is attached to the reverse end of the axis *c* and *e*, as shewn.

The pulley *o*, is fixed on the shaft *c*, and the pulley *p*, on the shaft *e*, and a stud or pin is fixed in the frame at *q*, to which the ends of two cords are made fast; these cords are carried round the pulleys *o* and *p*, and attached at their reverse ends to weighted levers, hence it will be seen that the friction upon either of the pulleys in unwinding the cloth will, by the tension of the cord, be so considerable as to keep the cloth tightly distended, as it is drawn from the roller *b*; but in winding on the cord will be relaxed, and the friction will be so trifling as not to impede the rotation in any degree.

The Patentee states, in conclusion, that in the figures there is shewn upon the shaft *i*, two different sized driving wheels, one upon each end, by which the speed of the gig barrel may be altered as desired, by throwing one or other into gear with the spur wheel upon the axle of the gig barrel by means of the sliding clutches, and that by placing an intermediate wheel, between the pinion, upon the axle of the gig barrel and the wheel *k*, the barrel may be made to reverse its motion, and yet that of the cloth continue unaltered; the wheel *k*, and the intermediate wheel being alternately thrown into gear with the pinion upon the axle of the gig barrel; but that these contrivances he does not consider as new, they are therefore not claimed.—[*Inrolled at the Rolls Chapel Office, Sept.* 1832.]

Specification drawn by Messrs. Newton and Berry.

To THOMAS COOK, *of Blackheath-road, in the county of Kent, Lieutenant in the Royal Navy, for his having invented certain improvements in the construction and fitting up of boats of various descriptions.* —[Sealed 24th April, 1830.]

THE improvements described under this Patent, apply principally to the construction of life boats, and consist, first, in covering the deck of the boat with a water tight canvas, secured by water tight joints all round its edges; and having bags formed in it, which descend below the deck, to contain the legs of the persons sitting in the boat.

Secondly, in the application of buoyant fenders placed all round the outside of the gunwale of the boat, which protects the boat when going alongside of a wreck, and also serve to keep the boat buoyant, in case she should have her bottom stove in. Thirdly, in improvements in the ballasting of a boat, with long bars of metal placed on each side of the keel, resting upon pins or bolts, and suspended by chains; these bars of ballast can be let go and relieve the boat of the weight in case she should fill with water. Fourthly, in the construction of the hooks or holdfast of the ropes, by which the sails are made fast, or other ropes used in the boat, and are so contrived, that they can be let go at a moment's notice, in case of a sudden squall coming on. Plate XIII. fig. 7, is a plan view of a boat, shewing some of the improvements adapted thereto. Fig. 8, is a transverse section of the same; *a, a,* is a shelf, placed all round on the inside of the boat, or it may form part of the deck. The water proof covering extends all over the inside of the boat like a deck, and is jointed to the shelf water tight at *b, b,* by forming a channel in a groove all round in the shelf; the edges of the water proof covering are introduced into the groove, and firmly secured by rods of wood or metal fastenings into the groove by screw bolts or otherwise; *c, c,* are bags, formed in the covering to contain the legs of the persons sitting in the boat.

In order to let out any water which may remain on the deck or covering, holes are made in the sides of the boat through the gunwale, usually stopped tight by screw plugs, but which can be removed and replaced as required; *d, d,* are the buoyant fenders, which are formed of strong water proof canvas, and filled with cork cuttings, shavings, or any other light material, extending round all the sides of the boat, and are firmly secured to it by lashings; *f, f,* are the bars of metal, forming the additional ballast to the boat; these bars rest upon bolts, projecting on both sides of the keel of the boat, and are kept in that situation by collars formed upon the bolts; in case of the boat becoming swamped, these bars can be removed by chains attached to their ends, and let fall away, thereby relieving the boat of their weight.

Fig. 9, shews a side view of one of the liberators to let go the boat's sheet, in case of a sudden squall coming on; *a,* is a metal plate to be fixed upon the part of the boat or vessel by screws; *b,* is a lever turning upon a pin as its fulcrum in the projecting ear on the plate; the shorter end of this lever is connected by a hinge joint to the pin or axle of the sheave or pulley *c*; the other end of its axle fits into a hole made in the plate; *d, d,* is a spring, pressing the longer end of the lever upwards, and keeping the pulley it its place; when the sheet is to be let go, the steersman has only to press down the lever, thereby raising the axle of the pulley out of the hole in the plate, when the tension of the rope will pull the pulley into the position shewn in fig. 10, and slipping off the pulley will let go the sail.

There must be two of these liberators placed, one on each side of the stern of the boat, for the use of the steersman. Fig. 11, shews another of these kind of liberators; *a*, is the plate; *b*, a hook to hold any rope which may require to be let go suddenly; this hook turns upon a hinge joint upon the plate, its end projecting into a hole formed in the piece *c*, which is jointed to the plate at one end; and at the other to one of the toggle jointed levers *d*, *d*; the end of the other of these toggle levers is jointed on to the plate *a*; *e*, is a handle connected to the toggle joint of the lever, and on pulling this handle into the position shewn in the figure, the hook *b*, will be free to turn upon its joint, and let go the rope. Fig. 12, shews a similar liberator connected with a pulley or sheave *a*, turning upon its axle, in the piece *b*; *c*, is the hook; *d*, the connecting or locking link; *e*, *e*, the toggle joints, one connected to the head of the axle of the sheave, and the other to the link *d*; *f*, is the handle, and on pulling it as before described, the same effect will be produced as before described.—[*Inrolled in the Inrolment Office, June,* 1830.]

Vessels rendered buoyant by means of bags filled with cork and other light materials, has been already proposed by Mr. R. Dickinson; see his patent of December, 1824, Vol X. page 28, First Series of this Journal.

To **Matthew Towgood,** *of Dartford, in the county of Kent, paper-maker, and* **Leapridge Smith,** *of Paternoster Row, in the city of London, stationer, for their having invented an improved mode of applying size to paper.*—[Sealed 18th August, 1830.]

This is an apparatus to be connected to a machine for making paper, on the principle of Fourdrinier's original Patent, and its object is to size the paper as it comes in a continuous sheet from the endless wire web. The operation is performed in this improved apparatus by rollers, the surfaces being supplied with size, and from which the size is communicated to the newly made paper, as it passes between these rollers. The following is the Patentees' account of their invention:—

Our improved mode of applying size to paper, consists in pressing liquid size forcibly upon the surface of the paper, by pouring out or spreading a thin film of liquid size upon the surface or surfaces of certain revolving pressing rollers of a cylindrical form, between the adjacent surfaces of two or more of which pressing rollers the paper is passed, and by means of the pressure given to the paper by those said adjacent surfaces (one or more of which surfaces is or are covered as aforesaid with liquid size,) a suitable quantity of size is applied to the paper, and forcibly presses thereon at the moment when the paper is passing between the said pressing rollers. The said pressing rollers are mounted in the usual manner, of what are called press rollers in paper making machines, viz. the gudgeons at their ends are mounted in a suitable frame, with their axles parallel to each other, and those axles are forced towards each other by screws, weights, or other suitable means, in order that the paper may be compressed with adequate force between the adjacent surfaces of the said rollers, when the said rollers are turned round so as to pass or roll the paper forwards through and between their adjacent surfaces.

The size which is to be applied to the paper must be spread upon the surface of one or more of the said pressing rollers, so as to cover the said surface with a thin and uniform film of liquid size, which may be done either by pouring out the liquid size in a number of small streams or jets, which fall upon or impinge against any convenient part of the circumference of the pressing rollers, and by the revolving motion thereof, its surface becomes covered with a continuous film of size, which will be applied to the paper when it is passing between the pressing rollers, and in so passing, the paper will be compressed between the surface so covered with a film of size and the adjacent surface of the other corresponding pressing roller, that application and pressure taking place as soon as can be done after the size has been so poured out on the said surface of the pressing roller; or else, if more convenient, the size may be spread upon the surface of one or more of the said revolving pressing rollers, by contact thereof, with another revolving roller or rollers, on the surface of which the liquid size may be poured in small streams as aforesaid, or in lieu thereof, the lower part of the latter roller may be immersed in a trough containing liquid size, the surface of the said latter roller being covered with felt, or it may be surrounded by an endless web of felt or other suitable substance, which, being of an elastic and spongy texture, will absorb the liquid size, whilst the felt or other substance is uncompressed, but from which felt or other substance the liquid size which it has so absorbed (or part thereof,) will be readily expressed and squeezed out again, when (by the revolving motion of the rollers), the said felt or other substance is brought in contact with the surface of that pressing roller on which the size is to be spread as aforesaid, and on which surface the size so squeezed out from the felt or other substance will be deposited, and will afterwards be communicated and applied to the paper with pressure, in order to force the size upon the surface of the paper as aforesaid.

And by virtue of our said improved mode of applying size to paper, whilst the paper is undergoing the pressure produced by passing the paper between revolving pressing rollers as aforesaid, that application may be made whilst the paper is in a wet state, or only partially dried.

The size may be applied by our improved mode, either to only one side of the paper, or to both sides thereof, as the substance and quality of the paper which is to be sized may require size to be applied to both sides, or only to one side. The said revolving pressing rollers, by means whereof we apply size to paper on our improved mode, may be added to the ordinary paper making machines (known by the name Fourdrinier's machinery, which operates by means of an endless web of woven wire cloth, moving horizontally, and circulating over a system of revolving rollers); and, by that addition to such machinery, size may be applied to one or both sides of the paper made by the machinery, during the operation of the machinery.

And whereas, the said ordinary paper making machines are now usually provided with drying machinery, consisting of a series of hollow revolving cylinders, which are kept hot by steam within side of them, and the paper (being passed over the external surfaces of these cylinders in close contact therewith), can be dried before it is removed from the machinery; such drying machinery may be used in the said paper making machinery in manner following, in conjunction with the revolving pressing rollers aforesaid, whereby we apply size to paper on our improved mode.

The paper after it comes out from between what are called the dry press rollers of the paper machinery, may be conducted over one or more such revolving steam drying cylinders before it is passed between the said revolving pressing rollers, whereby we apply size to the paper on our improved mode, and the admission of steam into the said drying cylinder or cylinders, may be so restrained and regulated as will cause the said cylinder or cylinders to dry the paper partially, and leave it with only so much wetness as will be the most proper state for applying size thereto on our improved mode; and after the size has been so applied, the sized paper as it comes out from between the said pressing rollers for applying the size as aforesaid may be gathered round a reel in the usual manner, and cut off from that reel into detached sheets of paper, which may be afterwards dried by hanging them up in the air; or else such kinds of paper as will bear rapid drying after being sized. The said sized paper as it comes out from between the said pressing rollers for applying the size as aforesaid, may be conducted over as many other drying cylinders as will dry it completely, before it is gathered around the reel, in order to be cut into detached sheets or otherwise. The said revolving pressing rollers, by means whereof we apply size to paper on our improved mode, may be arranged in a distant machine from any paper making machinery, into which distant machine detached sheets of paper in a wet state, or only partially dried, can be introduced one after another, in order to pass them between the adjacent surfaces of the said revolving pressing rollers, for the purpose of applying size to the paper according to our improved mode. And one or more of the said revolving pressing rollers, whereby we apply size to paper, may be made hollow within, in order to receive steam, which can be admitted in such quantity as will keep the metal of the roller and the film of size, which is spread upon its surface as hot as is desirable for applying size or paper on our improved mode.

Some of the said revolving pressing rollers, whereby we apply size to paper on our improved mode, are covered on the outside with felt, in order that one of the adjacent surfaces, between which the paper is pressed (during its passage between the revolving pressing rollers) may present a yielding substance to one side of the paper, whilst the other of those adjacent surfaces presents a hard and smooth surface of metal to the opposite side of the paper; or, instead of so covering the said revolving pressing rollers with felt, the same may be surrounded by an endless web of felt, which is so extended over a system of supporting rollers as to circulate freely over them; and that web passing through between the adjacent surfaces of the pressing rollers, the felt will be interposed between the metal surface of the rollers, and the paper whilst it is subjected to the pressure occasioned by passing through between the rollers.

Such endless felts may be applied around each of the two pressing rollers, which act on the opposite sides of the paper, so that the paper will be pressed between two felts, and the liquid size may be communicated to the paper from the revolving pressing rollers through the thickness of those endless felts, for which purpose the two pressing rollers between which the felts pass, with the paper including between them, must be kept constantly covered with a continuous film of liquid size either by causing one of the rollers to be immersed at the lower part of its circumference in a trough containing liquid size, by pouring out liquid size in streams or jets against the surface of the pressing rollers between which the said endless felts pass, with the paper included between them, and the size which is spread on the surface of the said pressing rollers, will by their pressing be forced through the thickness of the felts, and applies to the paper which is between them.

The latter arrangement of two endless felts, through which the size is to be pressed, is most suitable for a distinct machine for applying size by our improved mode to detached sheets of paper, and in order to facilitate the introduction of such detached sheets of paper between the two endless felts, two rollers out of the aforesaid two systems of supporting rollers, over which the two endless felts circulate, may be disposed so near to each other as to bring the two endless felts opposite to each other at some distance from the place where the same two felts are compressed between the adjacent surfaces of the pressing roller; and the paper being introduced between the two endless felts at the commencement of the part where they come opposite to each other, will be included between the adjacent surfaces of the two felts, and will remain so included whilst those felts move some distance forwards, and carry the paper with them between the pressing rollers to receive size therefrom, by the pressure rollers forcing the size, with which the surfaces are covered through the thickness of the felts, so as to apply the size to the paper.

For the more full explanation of the means of performing our said invention, we have hereunto annexed a drawing, see Plate XIV, in which fig. 7, represents so much of a Fourdrinier paper machine, as is necessary to explain the manner whereby we have added thereto, the pressing rollers and other apparatuses hereinbefore set forth for the purpose of applying size to paper on our improved mode during the operation of the machine. Fig. 8, represents a distinct machine, containing the pressing rollers and other apparatuses, for the purpose of applying size by our improved mode to detached sheets of paper, which are introduced one after another into the machine.

The construction of Fourdrinier's paper making machine, is so well known to mechanists and paper makers, that it is unnecessary to enter into any detailed description thereof. The additional pressing rollers for applying size to paper on our improved mode, are added to the machine without alteration in any part whereof the action precedes the action of the dry press rollers, between which the paper is pressed a second time in contact with the endless felt; and after coming out from between those dry press rollers, the paper is usually gathered upon a reel, or else in more modern machines, the paper is conducted round the first revolving steam cylinder of the series of drying cylinders; but when additional pressing rollers for applying size to paper on our improved mode are to be added to the machinery, the said reel may be removed from that part of the machine, or else the first of the drying cylinders may be removed, in order to gain a sufficient space for the said additional pressing rollers at *a, b, c,* and also a drying cylinder *d,* may be placed above the dry press rollers, the paper being conducted upwards from those rollers over a carrying roller *e,* which brings the paper in contact with the cylindrical metal surface of the drying cylinder *d,* and the paper passes nearly around that cylinder as far as the conducting roller *f,* from which it proceeds to the additional pressing rollers *a, b, c; g,* is a metal roller, which bears by its weight upon the paper at the highest part of the drying cylinder, and the roller *g*, being covered with felt, presses upon the paper at the opposite side thereof to that side which was pressed in contact with the felt in passing between the dry press rollers. *Note*, the weight of the roller *g*, should be rather less than what will produce the slightest pressure that can ever be required for the most tender kind of paper, and hooks should be applied to the gudgeons at each end of the roller *g*, in order that so much extra weight may be applied by means of loaded levers to bear down the roller as will regulate the pressure to make it suitable for any kind of paper in the same manner as is usually done for the upper rollers of the wet press rolls of the common machinery.

The drying cylinder *d*, is turned round by an endless strap, which is applied upon a sheave at the end of the axis of the lowest of the dry press rollers, and also upon a larger sheave on the axis of the cylinder *d*. The relative diameter of the two sheaves must be accurately in proportion to the relative diameter of the lower dry press roller, and of the steam cylinder *d*, in order that the surface of the latter may move with so nearly the same velocity as the surface of the dry press rollers move, so as to cause the drying cylinder *d*, to take up the paper precisely, as fast as the dry press rollers deliver out the paper, but no faster.

The paper is partially dried by passing round the cylinder *d*, and the admission of steam into that cylinder is regulated so that it may not dry the paper more than is requisite, in order to bring it to the most fit state for applying the size thereto on our improved mode.

The pressing rollers *a*, *b*, *c*, which we add to the machine, may be three in number, placed side by side, with their surfaces nearly in contact; the paper passes down between the first and second pressing roller, and then up again between the second and third pressing rollers, so as to be subjected to two successive pressures. The size is applied to that side of the paper which was uppermost upon the endless web or wire, when the paper is going through the first of those pressures, viz. between the pressing rollers *a*, and *b*, and the size is applied to the opposite side of the paper, when it is undergoing the second of these pressures, viz. between the pressing rollers *b*, and *c*. The middle roller *b*, may be turned round by means of an endless strap, which passes round a large sheave on the end of the axis of the drying cylinder *d*, and also round a small sheave on the end of its own axis; the strap being crossed, in order to turn the said roller round in a proper direction, and the relative diameters of the sheaves must be in true proportion to the relative diameters of the cylinder and the roller, in order that the pressing rollers may take up the paper as fast as the cylinder *d*, delivers it out.

Instead of the strap being applied upon the large sheave of the drying cylinder *d*, the middle pressing roller may be turned round by applying the endless strap upon a sheave of a suitable size, which is fixed on the axis of the lower dry press roller at the side of the sheave. The other two additional pressing rollers *a*, and *c*, may be turned round by the middle roller *b*, and to insure that the three rollers shall turn round together with certainty, a spur wheel may be fixed on the end of the axis of each roller, the teeth of those wheels engaging each other. The gudgeons at the opposite ends of the three pressing rollers are supported in one frame; the bearing bosses for the gudgeons of the two outside rollers being adjusted by setting screws, which advance the three rollers one towards the other, in order that they may press the paper between them. The two outside rollers are covered with felt, but the middle roller is a smooth metal surface.

The paper first passes over about one fourth of the circumference of the roller *a*, near the upper part, and the size is applied on the paper on one side, at the moment when the paper is pressed in passing downwards, between the rollers *a* and *b*; then the paper encompasses the lower half of the circumference of the middle roller *b*, and passes upwards between the rollers *b*, and *c*, size being applied to the other side of the paper at the moment when it receives a second pressure between the rollers *b* and *c*. After that second pressure, the sized paper passes over about one fourth of the circumference of the roller *c*, and is conducted away either to the steam cylinders of the drying machinery, in case the paper is of a quality to bear quick drying after it has been so sized, or if not, then the sized paper may be gathered on a reel in a damp state in the usual manner as fast as it comes away from the third additional roller.

When the sized paper is to be dried in the machine by the steam cylinders, as represented in fig. 7, at *h*, it will be advisable to cover the first of those steam cylinders with felt, in order to protect the fresh sized paper from a too sudden application of heat; and if the revolving motions of the several drying cylinders (which are not shewn in the figure), are communicated from one to another by toothed wheel work, with intermediate wheels in the usual manner of drying machinery, allowance must be made in the diameter of the metal of that first cylinder, for the thickness of its covering of felt, so that the diameter at the outside of the felt covering may be the same, as the diameter of the metal cylinder would be if no such covering was used; but, if the motion of the first steam cylinder, is transmitted to the next cylinder by an endless strap, then the allowance may be made in the diameter of the sheaves, on which the endless strap is applied.

The series of steam drying cylinders are turned round in the usual manner, by means of an endless strap extended from a small sheave on the axis of the lowest dry press roller (or else on the axis of the additional pressing roller), to a large sheave on the axis of one of the drying cylinders, or to a sheave on the axis of a toothed pinion, which links in one of the toothed wheels, on the axis of one of the drying cylinders; and the diameters of the sheaves on which the endless strap is applied, must be truly proportioned, in order that the first steam cylinder may take away the paper just as fast as the third additional pressing roller *c*, delivers it out.

The liquid size is conveyed by a pipe *i*, from an elevated size chest *k*, in which the size is kept warm by means of steam applied within a hollow bottom to the chest, or otherwise. The size is poured out at the lower end of the pipe *i*, in a small stream, which is regulated by turning a cock at the upper end of the pipe, and that stream runs into a long narrow trough *l*, or gutter, which extends horizontally all the length of the rollers, nearly over the space between the two rollers *a* and *b*.

This trough *l*, is fixed fast to an iron bar, which extends across the frame, and the bottom of the trough is perforated with small holes, at equal distances apart, in a row, which holes allow the size to drop or run in small streams, which are directed against the surface of the middle roller *b*, in order to cover the surface of that roller with a film of liquid size; and if there is any excess of size, it lodges in the vacant space between the two rollers, just above their place of pressure; and the paper wrapping over the roller *a*, the size is applied to the surface thereof, and that application is followed instantaneously by pressure given by the rollers *a* and *b*, during an imperceptible space of time; for the rollers being continually in motion, and carrying the paper downwards, it is brought in contact with the size with which the surface of the roller *b*, is covered, at the instant before it passes down between the adjacent surfaces of the two rollers, and the paper being subjected to a considerable pressure between those surfaces, that pressure tends to force the size into the substance of the paper, but does not allow any accumulation of size to remain on the surface of the paper after it has passed through the pressure given between the rollers.

If any excess of size is allowed to flow out of the pipe beyond that which the paper absorbs or carries away with it, that excess flows off from the two ends of the vacant space between the rollers *a* and *b*, at each end of those rollers, and is caught in a large tray *m*, which is fixed beneath the pressing rollers, and has an overflow spout from it to convey the size to a lower size chest *n*, which may be situated in any convenient place, or at the side of the machine, and the size which collects therein must be raised up again, from time to time, into the elevated size chest, in order to be warmed and used over again; *o*, is another pipe from the upper size chest, with a cock at the upper end, and a spout at the lower end, to convey the liquid size into a trough *p*, in which the lower part of a roller *q*, is immersed; the upper part of that roller makes a close contact with the under part of the third pressing roller, and the roller in it is turned round by that contact.

The roller *q*, is partially covered with a fillet of felt wound spiral wise about it, and by revolving in the size contained in the trough, it carries up size to the roller which is covered with felt, and communicates as much size to the surface thereof as will enable the roller *c*, to apply size to the paper at the opposite surface to that to which size was previously applied when the paper received a pressure between the rollers *a* and *b*; the said application of size by the roller *c*, being made at the moment when the paper is pressed between the rollers *b* and *c*. If any excess of size is admitted from the pipe into the size trough *p*, it will overflow by a waste spout, and fall into the tray below.

To keep the size warm, steam may be admitted into the interior of either of the pressing rollers *a*, *b*, or *c*, the rollers being left hollow within for that purpose, and the gudgeons at each end of the roller on which it is supported being perforated like tubes, in order to admit the entrance of steam at one end, and to allow the exit of condensed water at the other end.

The junction of the steam conveyance pipe and of the pipe for condensed water with the ends of the hollow gudgeous, being made tight by stuffing boxes in the usual manner of steam drying cylinders, a cock must be provided in the steam conveyance pipe, to regulate or stop off the admission of steam into the hollow pressing roller, as may be required, in order to regulate the heat which shall be given by the steam to that roller. It has been found that the size may be kept as hot as is requisite for sizing many sorts of paper without admitting any steam into the hollow pressing roller.

A scraper of steel, called a doctor, is shewn at *r*; its edge presses against the surface of the roller *b*, and removes any knots of paper or other extraneous matter which may get upon the roller, and the doctor scrapes the surface of the roller clean.

Fig. 8, is a section of a distinct machine for applying size to detached sheets of paper; *a* and *b*, are the pressing rollers mounted one above the other in a suitable frame; the lower one is turned either by a handle fixed on the end of one of its gudgeons, and worked by the strength of a man, or else by a connection of machinery with the end of one of its gudgeons. The upper roller *b*, is hollow, in order that it may not be too heavy, and it is weighted down (to make it act with suitable force of pressure) by hooks applied to each of its gudgeons, and connected with loaded levers in the manner usually practised for the wet press rolls of paper machinery; *c*, *c*, *c*, is an endless web of felt, which circulates over a system of supporting rollers; *d*, *d*, is another endless felt, which also circulates over a system of supporting rollers. Both the endless felts pass between the pressing rollers *a* and *b*, so as to be subjected to pressure therefrom, and the endless felts derive their circulating motion about their respective supporting rollers from the rollers *a* and *b*. The supporting rollers are so placed as to bring the upper endless felt in contact with the lower endless felt at some distance from the place where the pressure is produced between the pressing rollers. The detached sheets of paper are spread out one after another, upon that part of the lower endless felt, which is extended nearly in a horizontal plane at *e*, and the lower felt by moving continually forwards, carries the sheets of paper with it under the upper felt, at the part where that turns under the rollers, so that the paper is introduced between the two felts, and is subjected to the pressure of the pressing rollers *a* and *b*, whilst it remains interposed between the two felts.

The liquid size is applied to the surface of each of the pressing rollers by means of troughs, which are fixed horizontally opposite to the surface of the rollers, with rows of holes in the bottoms of them to pour out the liquid size, and cover the surface of the rollers with continuous felting, in the manner before described, and represented in fig. 7; and in like manner the troughs are supplied with size by pipes, proceeding from an elevated size chest which is not represented, but wherein the size is kept hot by application of steam or otherwise.

The cocks in the pipes should be regulated so as not to allow size to flow into the troughs any faster than the sheets of paper, which are passed in succession through between the rollers *a*, and *b*, will absorb and carry away the size with them. The size with which the surfaces of the rollers are thus covered is forced through the thickness of the endless felts, and applied through their medium from the rollers to the paper, at the moment when the paper together with the two felts between which it is interposed are subjected to the pressure occasioned by passing between the adjacent surfaces of the pressing rollers. There are scrapers placed with their edges in contact with the surfaces of the two pressing rollers, in a suitable manner to act as doctors, and keep the rollers clean.

Note.—The selvages of the endless felts may be extended by sewing edges to them, and to run between suitable guide wheels, in the usual manner of the endless felts of paper machines, in order to keep the felts stretched out to their full width.

Having now set forth the nature of our said invention, and fully described the manner of performing the same, we do hereby declare that what we claim as our invention is the improved mode hereinbefore described of applying size to paper, and which improved mode consists in passing the paper between two or more revolving pressing rollers, the surface of one or more of these rollers being previously covered with a continuous film of liquid size (by some of the means hereinbefore described), at such part or parts of the surface of the roller or rollers, as will produce pressure on the paper during the passage thereof between the said rollers, and which pressure forces the size (wherewith one or more of the said pressing rollers is covered as aforesaid), upon the surface of the paper with a tendency to press the size into the substance thereof, in the manner hereinbefore described.—[*Inrolled in the Petty Bag Office, February,* 1831].

To DAVID SELDEN, *of Liverpool, in the county palatine of Lancaster, merchant, in consequence of a communication made to him by a foreigner residing abroad, for an invention of an improved carding and slubbing engine, for wool, and other fibrous substances.*—[Sealed 22nd Nov. 1831.]

THE following is the specification of this invention, reference being made to the figures represented in Plate XIV.

The improvement for which I have solicited the above recited letters patent, consists in the adaptation of certain mechanism to a carding and slubbing engine, or to a series of carding and slubbing engines, whereby the wool or other fibrous materials may be taken in the form of slubbing direct from the carding engine, without the intervention of the billy, or other similar machine. In order to render this subject perfectly intelligible, I shall commence the description of this improvement at that part of the preparing process called the scribbling.

Let it be supposed that the wool or other fibrous material intended to be operated upon is about to be introduced into an ordinary scribbling engine, but from which I desire to take distinct slivers of certain breadths. The carding cylinder of the scribbling engine being about four feet six inches in length, I should place a board of an inch thick, edgewise, longitudinally over the middle of the feeding cloth, for the purpose of separating the wool or other material upon the feeding cloth into two distinct parcels, and keeping them distinct as the feeding goes on. This division of the material fed in, will cause its separation to be continued as it passes through the engine, and when it arrives at the doffing cylinder, the material may be taken off in distinct slivers. A scribbling engine is so well known, that it is not necessary for me to explain its construction; but the parts to which I am about to refer being additions to that engine, and constituting one of the modifications of the improvement, I have shewn them in the accompanying drawings as attached to an engine for scribbling wool. Fig. 1, is a longitudinal elevation of the machinery. Fig. 2, a transverse elevation, or front view of the same; *a*, may be supposed to represent the large carding cylinder; *b*, the fancy roller or cylinder by which the wool is raised immediately before it comes into contact with the doffing cylinder *c*.

It will be remembered that the wool or other material is separated, by the means above described, into two parts in the engine; consequently the doffing comb *d*, strips it off the doffing cylinder in two slivers. These slivers are severally conducted through a revolving trumpet tube *e*, placed before the doffing cylinder, its centre being level with the lowest action of the doffer comb; from thence the sliver passes to a pair of drawing rollers *f*, mounted immediately opposite to each trumpet. The several trumpet tubes (for there may be two or more, dependent upon the width of the machine) may be made to turn by bands or cords passing from a rotatory drum below and round the pulleys upon the trumpet tubes, [one of which is shewn detached at fig. 6,] which give a slight degree of twist to the sliver as it passes through; the amount of the twist depending upon the rotatory speed of the trumpet tubes, and also of the drawing rollers, which, as they revolve, conduct the slubbing forward. These drawing rollers may be actuated by a band from a rigger on the axle of any of the rotatory cylinders, carried round a pulley *g*, on which the axle of the lower drawing rollers, when the upper drawing rollers will turn by the friction of their contact. From the drawing rollers the slubbing is carried forward to be wound into a cop, which is done by the following means:—Small drums *h*, *h*, seen best in fig, 2, are mounted on axles turning in bearings in front of the machine, which are driven by a band passed over the pulley *i*, as shewn, or by any other suitable contrivance. Spools or bobbins with pivots are mounted in forks of the inclined arms *k*, *k*, *k*, *k*, and let down so as to bear upon the periphery of the drums *h*; and as these drums go round, the spools are made to revolve also by their contact. The slubbing therefore being led from the drawing rollers and attached to the spools, as the drums *h*, revolve, the spools revolve also, and cause the slubbing to wind round them, and thus form the cop.

In order to wind the slubbings in uniform coils, and form the cop in the shape of a cylinder with conical ends, the slubbingpasses through a long opening or crook guide formed on a vibrating arm *l*.

These vibrating arms hang on pins in the top rail *m*, passed through slots in the arms, seen best at fig. 2, and are made to traverse to and fro by means of their connection by pivot joints at their upper ends to the sliding rail *n*, *n*. The movement of the sliding rail is effected by an endless screw *o*, on the axle of the small drums *h*, *h*, which takes into a horizontal wheel on the perpendicular shaft *p*, and drives it round. At the top of this shaft *p*, there is a horizontal heart wheel *q*, which acts between two pins *r*, *r*, fixed to the top sliding rail *n*; and as the heart-wheel *q*, goes round, the rail is slidden to and fro upon bearings *j*, *j*, which causes the levers and guides to vibrate, and to traverse the slubbings as they advance, so as to lay the yarns upon the spools in uniform coils, alongside each other from end to end. As the bobbins fill and the cops increasing in diameter, they rise in their forked bearings, and consequently bring the slubbings higher up the crooked guide, which shortens the leverage of the guide arms, and prevents the slubbings from being conducted to the ends of the spools; hence the cops are made with conical ends, and consequently require no heads. The bobbins or spools carrying the cops thus formed are now to be placed in a creel, and as many ends of slubbing as will be necessary to feed the next carding engine, are to be taken from so many cops, and wound upon a large horizontal spool of corresponding length with the cylinders of the carder. But if the wool or other material has been sufficiently scribbled to be taken immediately to the finishing carder, then as many ends are to be taken from the cops in the creel, and wound on to the horizontal spool, as there are intended to be yarns or threads of slubbing taken from the doffer of the finishing carding engine. The large spool thus filled with slubbings, is now to be placed horizontally in the situation of the feeding cloth at the back of the finishing carder, as shewn in the drawings at fig. 3, which is a side view or elevation of the finishing carder; and fig. 4, is a section of the same, taken longitudinally through the middle of the machine. This finisher is a single carding engine with two doffing cylinders, covered with fillets of cards of about an inch in breadth, carried round the cylinders in rings, there being about an inch space between each ring or fillet; and the cylinders are so placed one over the other that those parts of the main carding cylinder which is not cleared by the fillets of the upper doffer, will be cleared by the fillets of the lower doffer.

The large spool or bobbin filled with the slubbings, as described, is to be placed horizontally at the ck of the machine, its pivots turning in bearings as at *a*, in figs. 3 and 4; and the ends of the slubbing taken therefrom are severally to be passed through distinct apertures between the partitions of the guide rack *b*, in order that each end of fibres may be directed to a distant fillet on the doffing cylinders. The wool or other material thus introduced is carried forward by the feeding rollers *c*, *c*, and after having passed through the engine, and been operated upon in the usual way, it is taken from the fillets of the two doffing cylinders *d*, *d*, in front, by the vibrating doffer combs *e*, *e*, actuated by a rod and crank *f*, in the ordinary manner. In front of each fillet a rotatory tube *g*, and pair of drawing rollers *h*, *h*, is mounted, a series of which extend across the machine. To the rails which support the rotatory tubes *g*, there are affixed guide racks *i*, *i*, formed of wood in thin slips, their carved edges standing in the grooves between the fillets; these are for the purpose of separating the slivers, keeping their fibres together, and conducting them severally to the respective tubes. The lower drawing rollers *h*, are made to revolve by pulleys and bands leading from any convenient rotatory part of the engine; the upper ones turn by friction. Whatever may be the speed given to the doffing cylinders, that of the drawing rollers should be slower by about one third or fourth of the speed, in order that the fibres of the wool or other material may not be drawn apart, but be laid in close spirals in the slubbing; and this twist will be greater or less according to the speed of the rotatory tubes *g*; but it is only desirable to give the slubbing such a slight twist as shall just keep its fibres together.

From the drawing rollers the slubbings pass forward to the winding apparatus, which is placed in a frame in front of the carding engine, and connected thereto by bevel gear, as shewn in the side view, fig. 3. This winding apparatus consists of a frame carrying two drums *k*, *k*, which turn in vertical directions on axles placed longitudinally. Over these drums an endless band *l*, *l*, *l*, *l*, passes, shewn best in the front view at fig. 5. Two planks *m*, *m*, fixed into the frame, are placed under the band for the purpose of supporting it; and to the edges of these planks forked standards *n*, *n*, *n*, are affixed, in which the pivots of a series of horizontal bobbins *o*, *o*, *o*, are intended to turn.

These bobbins are formed by cylindrical pieces of wood with small metal pivots, which drop into the forked standards *n*, *n*, and bear upon the endless band *l*, *l*. On rotatory motion being given to the drums *k*, *k*, through the bevel gear shewn in fig. 3, or by any other convenient means, the endless band *l*, *l*, is carried along the planks *m*, *m*, in the direction of the arrows, and the bobbins *o*, *o*, are made to revolve on their axes by the friction of the travelling endless band. The ends of slubbing therefore being conducted from the drawing rollers *h*, *h*, and passed over the guide rods *p*, *p*, mounted in semicircular or bent arms, are severally attached each to one of the bobbins; and hence as the travelling endless band goes on, the bobbins turn upon their axes, and wind on the slubbing.

In order that the slubbings may be traversed, and laid in uniform coils side by side upon the bobbins, from end to end, the bent arms, with the guide rails *p*, *p*, are made to advance and recede by a reciprocating movement, which is communicated to them through the long vibrating levers *q*, *q*, that carry the guides, and which levers are fixed on the ends of a shaft *r*, *r*, extending along the front of the winding frame. To this shaft is also attached an arm *s*, by which the shaft and its vibrating levers are moved. A long connecting rod *t*, *t*, that passes longitudinally through the machine, under the carding cylinder, is attached to the arm *s*, at one end by a staple, and at its reverse end is acted upon by a heart wheel. This heart wheel therefore being turned by any convenient connection to the rotary parts of the carding engine, causes the connecting rod *t*, to slide to and fro, by which movement the arm *s*, the shaft *r*, *r*, and the levers *q*, *q*, carrying the guides, are made to vibrate, and to traverse the slubbings from end to end of the bobbins as they wind on. But as it is desirable that the cops upon the bobbins should be formed with conical ends, there is a contrivance by which the traverse of the guides may be progressively shortened as the cop increases in diameter.

It will be perceived in fig. 4, that there is a small pinion *u*, turning upon an axle in the staple near the end of the connecting rod *t*, *t*, which acts in a rack formed in the arm *s*. Upon the axle of this pinion a small pendant lever *v*, is fixed, and also a ratchet in wheel *w*; and to the upper arm of this pendant lever a check string *x*, is attached, the reverse end of which string is made fast to a fixed staple. When by the larger diameter of the heart wheel comes round the connecting rod *t*, with the arm *s*, is moved forward, the check string will draw the upper arm of the small pendant lever *v*, and cause the pinion to turn, and to proceed a tooth or two up the rack, which by so doing raises that end of the connecting rod; and the palls *y*, in the teeth of the ratchet wheel prevent it from returning. Hence it will be perceived, that by a succession of strokes, the connecting rod will be raised to the top of the rack, by which means the extent of vibratory motion of the levers will be lessened, and consequently the guides will progressively shorten the traverse of the slubbings, and produce the cops with conical ends as required.

Lastly, I wish it to be understood that as the filleted doffer cylinders, and the tubes, as well as most of the other parts of the machinery having been long known, and in use, I do not claim them separately as forming any part of my invention, but I claim the novel arrangement of the whole machinery for giving to the doffing cylinder a motion exceeding that of the drawing rollers, and using the comb conjointly with the rotatory tube, by which I am enabled to produce an accumulation of fibres at that point, which accumulation is to be taken up by the rotatory motion of the tubes, and to cause the fibres to take spiral directions in the threads of slubbings, so as to throw the ends of the fibres upon the outside; and by varying this difference of motion between the doffers and the rollers, to lay the fibres more or less spirally as may be desired. When a slubbing or sliver of worsted should be made, the first described scribbling machine or breaker must have two doffing cylinders, one above the other, with a winding apparatus to each, and with two tubes to each, so that four slivers, instead of two, will be produced. Now by placing the upper doffer at a proper distance from the swift or main cylinder, just so much of the wool from the same will be received on it as may be desired, and this will be the longest wool. That proportion of wool or noil which is allowed to pass the first doffing cylinder, is received upon the second, and the swift or main cylinder is cleared. Thus, two slivers of the longest wool may be taken and wound upon the bobbins from the upper doffer, and the shortest wool may be wound on two bobbins from the lower one; answering in a measure the purpose of combing in worsted, and which in woollens serves to give the manufacturer the best part of his wool from the upper doffer for his warps, and from the lower the most suitable for his weft. This application of two doffers to sort the wool, or separate the long from the short fibres, I also claim as new, and forming part of this invention.—[*Inrolled in the Rolls Chapel Office, May*, 1832.]

Specification drawn by Messrs. Newton and Berry.

To Jacob Perkins, *of Fleet street, in the city of London, for his invention of improvements in generating steam.*—[Sealed 2nd July, 1831.]

This invention professes to be "a new method of producing a rapid generation of steam," and consists in an apparatus that may be constructed with, or added to the steam boiler or generator of steam. This apparatus may be considered as a lining to the internal surface of the boiler or generator, admitting the water to circulate between the two passages that are left open at the lower and upper parts of the lining, whereby that heat given off from the inner surface of the boiler, will be rapidly carried to the surface of the water, and given off with the steam; and such boilers may bear a higher degree of heat applied to them without injuring the metal.

The invention will be more clearly perceived by reference to the figures represented in Plate XIII. where fig. 14, is a longitudinal section of a boiler, consisting of a series of tubular vessels, descending from a flat plate, which plate represents the ordinary bottom of a boiler. These tubes, filled with water, descend into the furnace, presenting a very considerable surface to the flames and heated vapours which play around them, causing the water contained in the tubes to boil, and throw off steam into the upper part of the boiler.

There are internal tubes within these, represented upon a larger scale in section by the detached figure 15. The outer tube is marked *a*, *a*, and the inner tube *b*, is open both at top and bottom. These are the linings which constitute the invention or improvement. The inner tubes rest on the lower internal parts of the larger or outer tubes, and are supported by legs, which form a free space all round, and also at the bottom, in order to produce the free circulation of the water through both.

The boiler in fig. 14, is represented as formed with two domes, connected at their upper parts by a pipe, which allows the passage of the steam, and equallizes its pressure in both; and there is also a pipe of communication, which causes the water to flow to the same level in both domes; there is a pipe for supplying the water, and a pipe for conducting the steam to work the engines; also a safety valve.

The tubes descending from the plate may be ranged in any order to suit convenience, and in any number that shall be found desirable, according to the required capacity of the boiler, as the invention does not consist in the form of the boiler, but in the adaptation of the linings.

"On lighting a fire in the furnace, the heat will strike against the outer surface of the tubes *a*, and thus give off heat to the water which is in contact with the metal; and such heated water will rise to the surface, and give off so much of it as is converted into steam; while the inner column of water contained in the tub *b*, will descend, and continue it fill up the space of that part which has become heated, and is rising to the surface. Thus will a very rapid circulation of the water take place in each of the tubes, caused by the inner tubes or linings; and by such rapid circulation, however great the degree of heat applied to the outer area of the tubes, the rapid circulation will carry up the same, and give it off at the surface with the steam, and at all times keep the tubes at a temperature which will not injure the metal, as would be the case were the inner tubes or linings not used."

Fig. 16, shews another mode of adapting the same principles, by the section of what is commonly called a waggon boiler, for a low pressure engine; or the same might be adapted to a cylindrical boiler for high pressure. Within the boiler curved plates *c, c, c,* are attached by pins or rivets, forming linings running from end to end of the interior surface of the boiler, but kept apart from the surface of the boiler, and open at the bottom and top to admit the free passage of the water between; by means of these linings a rapid circulation of the water is effected in the direction shewn by the arrows.

In the last described figure it will be seen that two separate fire places are used, "the object of which is, that the partitions of brick work which run the whole length under the boiler, should prevent the fire acting under that part of the boiler, by which means the water over such brick work always contains less caloric than that which is directly acted upon by the fire; and by the action caused by the partitions or lining *c*, a rapid circulation will be produced, which will take up the heat more quickly from the inner surface of the boiler, and give it off with the steam."

"Having now described the natureof my invention, and having shewn my improvements as applied to different descriptions of steam boilers, it will be evident from the nature of the invention, that the shapes of the boilers may be varied without departing from my invention, which I hereby declare to consist in applying the linings *c*; by any apparatus, upon the principles, and by the method above described, for the purpose of obtaining a rapid circulation of the water in steam boilers or generators, and thus causing the water to take up the heat from the inner surface of such steam boilers or generators, and thereby producing a rapid generation of steam with less injury to the metal or material of the boiler as above described.—[*Inrolled in the Inrolment Office, January*, 1832.]

New Patents

GRANTED IN ENGLAND IN 1832.

To William Joyce, of Bow, in the county of Middlesex, harness maker, for his invention of certain improvements in the making or constructing of collars for horses and other animals.—Sealed 22nd August, to inroll within 6 months.

To Daniel Horton, and George Horton, of the Leys iron works, in the parish of Kingswinford, in the county of Stafford, iron masters and copartners, for their invention of an improved puddling furnace for the better production of manufactured iron·in the process of obtaining it from the pig.—Sealed 7th Sept. 6 months.

To George Jones, of Wolverhampton, in the county of Stafford iron master; James Foster of Stourbridge in the county of Worcester, iron master; and John Barker, and John Jones, both of Wolverhampton aforesaid, iron-masters, for their invention and improvement on the process now in use for producing or making malleable iron. —Sealed 8th September, 6 months.

To Caroline Eliza Ann Burges, of Beaufort, in the county of Sussex, spinster, for her invention of an improuement, or apparatus for sketching, drawing, or delineating, —Sealed 8th September, 6 months,

John Osborne Mosley, and George Bell, both of Primrose Hill, Salisbury-square, in the parish of St. Brides, in the city of London, dye-sinkers and embossers copartners for their invention or improvement in the making or manufacturing of pill or other boxes, from paste board paper or other materials which improvements are applicable to other purposes.—Sealed 8th September, 6 months.

To Nicholas Troughton, of Swansea, in the county of Glamorgan, copper smelter, for his invention of an improvement or improvements in preparing the materials for, and in producing a cement, applicable to building and other purposes, which he denominates metallic cement.—Sealed 8th September, 2 months.

To Pierre Frederic Fischer, of Chester Place, Regent's Park, in the county of Middlesex, gentleman, for an invention communicated to him by a certain foreigner residing abroad, of certain improvements in piano fortes.—Sealed 8th of September, 6 months.

To John Brown, of Heaton Norris, in the county of Lancaster, cotton manufacturer, and Thomas Heys, of Heaton Norris, aforesaid, book-keeper, for their invention of an improvement in the machinery used for spinning cotton, silk, flax, and other fibrous substances, commonly called throstles.—Sealed 8th of September, 2 months.

To Richard Badnall, the younger formerly of Ashenhurst-Hall, near Leek, in the county of Stafford, but now residing in the Town of Douglas, in the Isle of Man, Gentleman, for his improvement in the construction or formation of the frames or rails, or lines of rail or frame roads upon which locomotive engines shall or may work.—Sealed, 1th Sep. 6 months.

To Richard Whytock, of the city of Edinburgh, in that part of Great Britain called Scotland, manufacturer, for his invention of an improved method or manufacture which facilitates the production of regular figures or patterns, on different fabrics particularly velvet, velvet pile and Brussels Wilton, and Turkey carpets. —8th Sep. 6 months.

To Richard Trevithich, of Camborn, in the county of Cornwall, engineer, for his invention of an improvement or improvements on the steam engine, and in the application of steam power to navigation and to locomotion.—22nd Sep. 6 months.

To John Howard Ryan, of Gillingham-street, Pimlico, Esq. for an improved mode of preserving paper canvas, cloth, and cordage, for ships and other uses, and the raw materials of hemp, flax, or cotton, from which the same may wholly or in part be made.—22nd Sep. 6 months.

CELESTIAL PHENOMENA, for October, 1832.

D.	H.	M.	
1	0	0	The Earth in the plain of ♄'s ring.
1	0	0	Clock after the ☉ 23 sec. 10m.
1	0	0	☉ rises 6h. 13. sets 5 h. 47 m.
1	0	0	☽ rises 10 h. 11 m.
1	0	0	☽ passes the meridian, 6 h. 2 m.
1	0	0	☿ passes the meridian, 23 h. 8 m.
1	7	37	☽ in □ or first quarter.
1	9	46	Jupiter's first sat. will immerge.
2	8	1	Jupiter's fourth sat. will immerge.
2	10	57	Jupiter's fourth sat. will immerge.
2	19	0	☽ in Apogee.
5	0	0	Clock after the ☉ 11 m. 37 s.
5	0	0	☉ rises 6 h. 21 m. sets 5 h. 49 m.
5	0	0	☽ rises 1 h. 1 m.
7	0	0	Vesta R. A. 13 h. 7 m. dec. 1. 15. S.
7	0	0	Juno R. A. 13 h. 1 m. dec. 1. 39 S.
7	0	0	Pallas R. A. 23 h. 33 m. dec. 8. 52. S.
7	0	0	Ceres R. A. 2 h. 59 m. dec. 5. 3. N.
7	7	42	☽ in conj. with ♃ long. 20. in Taurus, ☽ lat. 3. 48. S. ♃ lat. 5. 1. S. diff. of lat. 1. 13.
8	0	0	☽ passes the meridian, 11 h. 30 m.
8	11	41	Jupiter's first sat. will immerge.
9	7	36	Ecliptic opposition or ○ full moon.
10	0	0	Clock after the ☉ 13 m.
10	0	0	☉ rises 6 h. 31 m. sets 5 h. 29 m.
10	0	0	☽ rises 6 h. 10 m.
10	0	0	☽ passes the meridian 0 h. 16 m.
10	6	10	Jupiter's first sat. will immerge
10	0	0	☿ passes the meridian 23 h. 31 m.
12	9	54	Jupiter's third satellite will immerge.
13	0	0	♄ passes the meridian 22 h. 18 m.
13	0	0	Jupiter passes the meridian 10 h. 11 m.
13	0	0	♂ passes the meridian 15 h. 6 m.
13	0	0	♀ passes the meridian 1 h. 20 m.
13	14	46	☽ in conj. with ♂ long. 14. in Cancer, ☽ lat. 2. 36. S. ♂ lat. 54. S. diff. of lat. 1. 42.
14	0	0	☿ stationary.
15	0	0	Clock after the ☉ 14 m 12 sec.
15	0	0	☉ rises 6 h. 40 m. sets 5 h. 20. m.
15	0	0	☽ rises 9 h. 27 min
15	13	36	Jupiter's first sat. will immerge.
16	8	34	☽ in □ or last quarter.
16	7	29	Jupiter's second sat. will im.
17	8	5	Jupiter's first sat. will immerge.
17	7	0	☽ in Perigee.
19	0	0	Vesta R. A. 13 h. 30 m. dec. 4. 26. S.
19	0	0	Juno R. A. 13 h. 18 m. dec. 3. 27. S.
19	0	0	Pallas R. A. 23 h. 56 m. dec. 11. 12. S.
19	0	0	Ceres R. A. 2 h. 50 m. dec. 4. 31. N.
20	14	7	☽ in conj. with ♄ long. 23. in Scorpio ☽ lat. 3. 56. N. Sat. lat. 1. 55. N. diff. of lat. 2. 1
20	0	0	Clock after the ☉ 15 m. 9 sec.
20	0	0	☉ rises 6 h. 50 m. sets 5 h. 10 m.
20	0	0	☽ rises 2 h. 16 m.
20	0	0	☽ passes meridian 9 h. 24 m.
22	0	0	☉ enters Scorpio
23	6	49	Ecliptic conj. ● or new moon.
23	7	10	☽ in conj with ☿ long. 29. in Libra, ☽ lat. 5. 0. N ☿ lat. 37. N. diff. of lat. 4. 23.
23	10	5	♃'s second satellite will im.
24	10	0	Jupiter's first satellite will immerge.
25	0	0	♅ stationary.
25	0	0	Clock after the ☉ 15 m. 49 s.
25	0	0	○ rises 6 h. 59 m. sets 5 h. 1 m.
25	0	0	☽ sets 6 h. 50 m.
25	0	0	☽ passes the meridian 1 h. 31 m.
25	0	0	☿ passes the meridian 0 h. 5 m.
25	0	0	♀ passes the meridian 1 h. 34 m.
25	0	0	♂ passes the meridian 14 h. 16 m.
25	0	0	♃ passes the meridian 9 h. 22 m.
25	0	0	Saturn passes the meridian 21 h. 37. m.
30	0	0	☽ passes the meridian 5 h. 37 m.
30	0	0	☽ sets 9 h. 52 m.
30	0	0	○ rises 7 h. 9 m. sets 4 h. 51 m.
30	0	0	Clock after the ○ 16 m. 12s.
30	16	0	☽ in apogee.
31	4	6	☽ in □ or first quarter.
31	11	57	Jupiter's first satellite will immerge.

Jupiter will be in a favourable situation for observation during the whole of this Month.

J. LEWTHWAITE. Rotherhithe

METEROLOGICAL JOURNAL,

1832.	Thermo.		Barometer.		Rain in inches
	Hig.	Low	Hig.	Low.	
Aug 26	61	43	29,76	29,69	1,
27	61	39	29,72	29,52	,05
28	59	41	29,26	29,18	,525
29	57	43	29,35	29,28	,15
30	59	44	29,51	29,44	,15
31	63	42	29,72	29,68	
Sep. 1	63	42	29,69	29,52	,425
2	63	44	29,82	29,82	,575
3	65	41	30,17	30,02	
4	63	40	30,21	30,16	
5	64	39	30,05	30,00	
6	65	41	29,94	29,80	
7	61	40	29,76	29,69	,075
8	60	41	29,69	29,60	,025
9	65	48	29,91	29,84	
10	62	50	29,84	29,75	,05
Sep. 11	64	40	30,11	30,00	,075
12	63	37	30,17	30,13	
13	66	50	30,03	29,92	
14	64	45	29,90	29,80	,025
15	62	41	30,04	29,90	
16	64	41	30,15	30,09	
17	63	45	30,22	30,07	
18	61	50	30,04	29,94	
19	57	35	30,36	30,10	
20	61	30	30,44	30,42	
21	65	38	30,46	30,44	
22	64	39	30,42	30,31	
23	67	40	30,29	30,24	
24	73	38	30,38	30,30	
25	71	40	30,35	30,30	

Edmonton. **CHARLES HENRY ADAMS.**

Latitude 51° 37 32 N.
Longitude 3 51 West of Greenwich.

THE

London

JOURNAL OF ARTS AND SCIENCES,

AND

REPERTORY

OF

PATENT INVENTIONS.

No. VII.
(CONJOINED SERIES.)

Recent Patents.

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To JOSHUA BATES, *of Bishopsgate-street, in the city of London, gentleman, in consequence of a communication made to him by a certain foreigner residing abroad, for an invention of certain improvements in machinery or apparatus for roving, twisting, or spinning cotton, silk, wool, hemp, flax, or other fibrous substances.*—[Sealed 27th October, 1831.]

THE machinery described in the Specification of the above patent is applicable to the forming of rovings of any fibrous material fit to be spun into thread or yarn by other machinery, or it may be made to give the roving or sliver of fibrous material the necessary twist fit for any purpose where fine spinning is not required, such as rope yarns, &c. and by this apparatus the filament of material is drawn to the required fineness before twisting. It will be seen on reference to figs. 1, and 2, plate XV, that this apparatus consists of two machines, viz. the *drawing frame,* by which a filament is drawn out from a mass of material, and the *bobbin frame* for spinning or twisting such filament. These figures are side elevations of an apparatus for making rope yarns, and will sufficiently explain the nature of this invention, although machinery for forming fine rovings or yarns, or for cotton, silk, &c. must necessarily be made to suit the working of such material, and the fineness of the thread or yarn required. Figs. 3 and 4, are plan views of the same; fig. 5, is a horizontal section of the *drawing frame* taken near the bottom.—The *drawing frame* consists of a frame work of wood *a, a,* across the top of which are mounted in bearings the axles of the drums *b* 1, and *b* 2, carrying the endless heckle belt *c, c.* This belt is formed by a number of rows of metal points *a, a,* (see the detached figure 6,) firmly screwed into the heckle plates *b, b*; *c, c,* are pins at each ends of the rows of points having heads or stops, and are longer than the points *a.*

Before fixing these pins to the heckle plate *b,* a second plate of metal *d,* pierced with holes corresponding with the points and pins is placed upon them, the pins *c, c,* are then put in their places and fixed to the heckle plate *b.* The plate *d,* is called a clearer, and moves freely up and down the points and pins, the pin heads preventing it from being removed; the plate *d,* is longer than the plate *b,* its ends projecting over that plate. A strap of leather, or of strong webbing, is next formed, long enough to form the belt *c,* pierced with holes in rows crosswise corresponding to the five middle points. These rows of holes are about 7-8ths of an inch apart, and are arranged so that the pins in each alternate row shall be opposite the spaces of the last row.

The strap is passed between the clearer *d*, and the points *a, a*, it being raised as in fig. 6, and the points inserted in a row of holes, and the strap pressed down upon the plate *b*. This is repeated until all the holes of the strap are filled, the rows of points are turned, so that the wide space between the first and second points shall be on each side of the strap alternately in the successive rows; another strap is then firmly secured to the one containing the points, the heckle plates being between them.

The straps with the points are then passed round the pulleys *b* 1, and *b* 2, see fig. 1, and the ends fastened together, forming the heckle belt *c, c*; *d*, is a pulley capable of adjustment, to keep the heckle belt to a proper tension; *e, e*, are guides fixed to the frame *a, a*, to keep the belt evenly upon the pulleys *b* 1, and *b* 2; the parts *e, e*, point downwards, the heckle plates passing between them; *f, f*, are two iron rails fixed parallel to each other above the top of the frame. The distance between these rails is equal to the length of the heckle plates, which, with the belt *c*, pass between them as guides; one end of these rails is placed about one quarter of an inch above the top of the pulley *b* 1, and the other end about one inch above the pulley *b* 2, forming a slight inclined plane, and are turned down in a curve as shown in fig 1.

On the inside of the rails *f, f*, there is a projecting ledge in a line with the tops of the pulleys *b* 1, *b* 2; these ledges support the ends of the heckle plates *b*, as they slide along them. The ends of the clearers *d, d*, slide upon the tops of the rails *f, f*. The sliver of hemp flax or other fibrous material to be operated upon is introduced into the machine, through the trumpet *g*, and passed up over the pulley *b* 1, and is delivered from the contracted end of the trumpet, to the action of the heckle points and the endless chain *h*, *h*.

This chain is formed of a number of wooden rods having slits formed in each of their ends; in these slits straps are placed, and the rods fastened to them, parallel to each other, corresponding with the spaces between the rows of heckle points; this chain is carried by the pulley *i*, *i*, supported in standards affixed to the rails *f*, *f*. On the sliver of the material being introduced into the machine, and submitted to the action of the heckle belt, it is set in motion by a band passing from any first mover to the fast rigger *j*, upon the shaft *k*; this shaft also carries the rigger *l*, which communicates by a strap to the pulley *m*, which gives motion through a connection, called the regulator, to the pulley *n*, from whence a strap passes to the pulley *o*, on a cross shaft, upon the top of the frame; upon this shaft is the pinion *p*, taking into an intermediate wheel upon another shaft, carrying another pinion which takes into and communicates motion to the toothed wheel upon the axle of the drum *b* 1.

The sliver will now be carried forward by the chain *h*, pressing the filament into the heckle points (the rods lying between the rows of points), until it reaches the other end of the machine, where the chain rises, and the heckle points turn down over the pulley *b* 2; the sliver will now be raised out of the heckle points by the clearers and collected by the gatherer or guide *q*, and passed between the pair of drawing rollers *r*, *r*, mounted upon axles, the upper one turning in bearings in the levers *s*, *s*, having their fulcrums in their standards, and are connected together by a bent piece.

The axis of the lower drawing roller has its bearings in the standard; motion is communicated to the rollers *r*, by the pinion on the shaft *k*, taking into the spur wheel *t*, its axis being connected by coupling pieces to the axis of the lower drawing roller. On the shaft of the wheel *t*, is a pinion taking into another pinion, on another axle, coupled to the axle of the upper drawing roller.

The gatherer *q*, is fixed upon a support, and is formed of plates of metal like an unequal sided pyramid, with its open base towards the heckle points, and its apex opening between the drawing rollers *n*, *r*; the top of the gatherer is continued towards the chain, with pieces of metal bent over it on each side, between the heckle points and the pins. The end of the filament being passed through the gatherer, it will be made to enter between the drawing rollers, and, if they are turned faster than the heckle belt moves, it will be drawn out from the heckle points, and elongated into a thinner filament. The mode of regulating the supply of the material to the drawing rollers, for preventing irregularity in the roving or yarn is as follows:—when the filament is passed between the drawing rollers, the upper one rests upon it, and should the filament, as it proceeds, become too small, it will descend, approaching nearer the lower one.

To the ends of the levers *s*, *s*, are attached the vertical rods *u*, *u*, supporting a cross head, and upon it rests the adjusting thumb screw of the rod *v*, which is connected at its lower end to the lever *w*, on the end of the shaft *x*, which turns in bearings at the bottom of the frame; at the opposite end of the shaft *x*, is the vertical arm *y*. A steel spring *z*, is fixed upon the shaft *x*, near its middle, and lays along it, turning upwards, its end pressing against the top of the arm *y*; a connecting rod passes from a hook in the top of this spring to another hook fixed in the underside of the horizontal slide bar 1, 1; 2, is a right angle lever having its fulcrum in its angle, on a support attached to the inside of the frame. The vertical arm of the lever 2, is connected to the bottom of the slide bar *x*, and on the other arm is suspended a weight.

The pulley *m*, before mentioned is mounted on a shaft 3, running on centres, shown detached in fig. 7, and carrying the toothed wheels 4, and 5, (4, having fifty and 5, seventy teeth) turning loosely upon it, but kept in their places by collars; this shaft also carries the clutch boxes 6 and 7, which are allowed to slide along the shaft, but are keyed to it by a pin and groove, so that they must revolve with it. On the sliding bar 1, are the arms 8 and 9, carrying pieces which embrace and work in the clutch boxes 6, and 7, and as the bar moves they slide the clutch boxes along the shaft.

The pulley *n*, is mounted upon the shaft 10, which also carries the toothed wheels 11, and 12, (11, having seventy, and 12 fifty teeth). The clutch box 6, carries the clutch or locking pin 13, connected by a hinge joint to it, and is kept in its proper place by a spring and stop. On the supply of the material to the drawing rollers decreasing, the upper one must descend, as also the levers *s*, *s*, depressing the rods *u*, *u*, the cross head, and the rod *v*, when the weight through the angle lever 2, will draw the the slide bar 1, to the right, as also the vertical arm *y*, and spring *z*, turning the shaft *x*, partly round, keeping the arm *w*, in contact with the rod *v*. This movement of the slide bar, will bring the catch 13, against the stud 14, on the wheel 4, and cause it to revolve, driving the wheel 11, which will communicate motion to the pulley *n*, and that by the strap, through the train of wheels before mentioned, to the carrying pulley *b* 1, and thus the heckle belt will be removed, and the filament advanced towards the drawing rollers *r, r*.

If the advance of the fibres is sufficient to increase the filament to its proper size, then the upper drawing roller will be raised, and the bar 1, with the clutch boxes, be moved back to the left, by which the catch 13, will be disengaged from the pin 14; and the wheel 4, with the pulleys, wheels and pinions, by which it gave motion to the pulley *b* 1, come to a state of rest. It may happen, that the size of the filament does not increase sufficiently, but that it still diminishes. In this case, the upper roller will continue to fall, and the bar 1, to move to the right until the catch 15, on the clutch box 7, engages with the pin 16, upon the wheel 5, and carrying it round, gives motion to the wheel 12, and the shaft 10.

The pulley *m*, and consequently the heckle belt, will then be driven much faster, and the filament be advanced more rapidly to the drawing rollers; on the filament increasing to the proper size the top roller will raise the bar 1, and the clutch boxes move to the left, and the catch 15, be disengaged from 16.

When the catch 15, is engaged with the pin 16, the catch 14, will move faster than 13, and must pass it without locking; to effect this, their outward sides form inclined planes, sliding upon each other when in contact, the catch 13, giving way by the spring, and allowing 14, to pass, the spring forcing 13, into its former position. If the advancement of the filament as above, brings too great a number of fibres to the drawing rollers, the upper roller will be elevated above its proper place, and also the levers *s, s*, the rods *u, u*, cross head, and the rod *v*, when the arm *w*, turning the shaft *x*, partly round the reverse way, which will cause the spring to move the sliding bar 1, and clutch boxes to the left, until the locking pin, 17, on the clutch box 7, engages with the star wheel 18; this star wheel turns loosely upon the shaft 3, kept in its place by collars, the plates 19, projecting over the arms (see fig. 8); 20, is a lever moving between guides, its fulcrum being at 21; upon the end of this lever, next the star wheel, is a piece of metal, 22, united to it by a hinge joint; the lower end of the piece 22, is in the horizontal plane of the centre of the shaft 3, but so far from it that the plates, 20, are just capable of throwing it upwards when they are turned round; 23, is a stop upon the end of the lever; 24, is a spring to keep the top of 22, against 23; 25, is a catch, connected by a hinge joint to the frame work, and passing up through a hole in the slide bar; a spring is fixed to the frame, which tends to press 25, against the lever 20; and whenever its end is raised by the movement of the star wheel above the catch 25, it will slip under it, and hold it up.

There is a stop piece fixed in the slide bar, which, as it is moved back again, will push back the catch 25, also the locking pin 17, from the star wheel; 26, is a weight, to depress the lever into its former position. On the star wheel raising the end of 20, the other end will be depressed, also the rods 27, connected to it, and the comb 28, fixed on its top. This comb is formed of several rows of heckle teeth fixed in an iron plate. Through the top of the gatherer *q*, there are holes formed, corresponding to the points of the comb, to allow the teeth passing through it into the sliver; 29, is a lever, one end connected to 20, the other to the rod 30, passing through the bottom of the gatherer, which has a false bottom hung by a joint at the end next the drawing rollers, having holes in it like its top.

When the right hand end of 20, is depressed, the same end of 29, will be elevated, moving the rod 30, upwards, lifting the false bottom of the gatherer, the comb at the same time being depressed. These movements will cause the teeth of the comb to be passed into the filament in the gatherer, and prevent the free passage of the fibres to the drawing rollers; the size of the filament will thus be reduced. The slide bar will then move to the right, carrying the catch 25, from under the lever 20, the weight 26, depressing the lever by which the comb will be raised, and the false bottom depressed.

On the passage of a knot of entangled fibres or tow through the drawing rollers, the clutch boxes will be brought against the collars of the wheels 5 and 18, preventing the bar *x*, from moving farther to the left, the spring *z*, then yields as the shaft *x*, turns. After the tow, &c. has passed, the upper roller falls, and the spring *z*, is relieved.

The second part of the invention is the *bobbin frame*, by which the filament is twisted and wound upon the bobbins.

Figs. 2 and 4, are views of the bobbin frame, connected with the drawing frame; *a, a*, is a frame work of wood; *b*, the bobbin spindle, turning in bearings upon the cross piece of the frame; *c*, is the bobbin, kept in its place upon the spindle by a pin passing through it, and an ear on the bobbin. Motion is communicated to the spindle, through the pulley *d*, as follows:—on the shaft *k*, in the *drawing frame* (fig. 1), is the pulley *e*, with a band communicating motion to the pulley *f*, (fig. 2), on its shaft, is the bevel wheel *g*, taking into another bevel wheel on the shaft of the drum *h*; *i*, is a strap, giving motion from *h*, to the pulley *d*. The roller *j*, in its swing frame, bears against the strap *i*, to keep it in proper tension; *k*, is the bobbin flyer, turning on hollow bearings, and receives motion by the pulley *l*, through the strap leading from an enlarged part of the drum *h*.

The filament as delivered from drawing rollers is passed through the hollow gudgeon *m*, over the small pulleys in the flyer, and its end fastened to the bobbin, when, by the revolutions of the flyer and bobbin, it will be twisted into rovings, thread, or yarn, according to the speeds given to the machine. In order that it may be wound up, the bobbin and flyer do not revolve at the same speeds, the pulley *l*, receiving its motion from a larger part of the drum *h*, than the strap *i*, while the pulleys *d*, and *e*, are nearly equal in size; hence the flyer moves faster than the bobbin, and the twisted filament is wound upon it. The tension of the strap *i*, is so slight, that the tension or draft of the yarn, as the bobbin becomes filled, draws the bobbin spindle and drum round faster than the strap *i*, moves. To spread the yarn or roving over the surface of the bobbin, it is moved alternately to and fro in the flyer; *n*, is a collar on the bobbin spindle, running on a stud *o*, in the slide bar *p*, which receives its reciprocating motion, as follows: on the shaft *k*, of the *drawing frame*, (fig 1.) there is a small pulley with a band passing to the pulley *q*, (fig. 1); on its axle is another pulley and a strap, giving motion to the pulleys *r*, and *s*, (fig. 2); a band passes from these to the pulleys *t*, and *u*, which give motion by the strap to the pulley *v*, and heart wheel *w*, which, as it revolves between the pins upon the slide bar *x*, moves it backwards and forwards. Straps are fastened to the bar and pass over the pulley *y*, in opposite directions, attached at their other ends to its periphery on different sides; and upon its axle is another pulley *z*, having two straps passed round it, and fastened to the slide bar *p*; and by these means the necessary reciprocating motion is communicated to it and the bobbin. The strap *i*, sliding along the drum *h*, and roller *j*.

There remains now to describe the apparatus by which the motion of the machine is stopped when the yarn is broken. Between figs. 2 and 3, is a rod 1, connected by a joint at one end to the *drawing frame*, the other end is bent into a hook, resting against the yarn or roving where it is being twisted between fig. 1 and 2. Upon one side of the rod 1, is the forked piece 2, through it the strap by which the machine is driven passes. To the hooked end of the bar 1, is attached a cord, passing over the pulley 3, in the end of the *bobbin frame*, and suspending a small weight, 4, which keeps the hooked end against the thread or yarn. Should the yarn break, the end of the rod 1, will be moved by the weight towards the pulley 3, and the driving strap carried by the forked guide 2, on to the loose pulley 5, consequently the motion of the machine will be stopped.

The Patentee states in conclusion, that, "In the fore- " going specification I have described many parts which " are not new, and are not intended to be claimed as " novel, or as exclusively belonging to this invention; " but I consider, and therefore claim under the above " named Letters Patent, as novel, improvements in machi- " nery or apparatus for roving and twisting fibrous mate- " rials. The combinations and arrangements of the plates, " points, pins, clearers, straps, &c. forming the heckle " belt, which, with its pullies, rails, and forcing plates, " constitute the apparatus, from which a sliver of hemp, " flax, or other fibrous material is drawn out or elongated " into a finer filament by the drawing roller, and also " the manner or mode of regulating the supply of fi- " brous material to the drawing rollers through the parts " of the regulator, and its connection with the first mover, " the heckle belt, the comb and gatherer, and the draw- " ing rollers. Though I do not mean to confine myself to " the precise form or arrangement of the parts as herein " described, as different fibrous materials will require dif- " ferent parts, speeds, and motions; and also I claim " generally the arrangement of the whole machinery or

" apparatus, with the *bobbin frame* where the filament " is twisted as herein described, together with the manner " of stopping the machine on the breaking of the yarn " or thread."—[*Inrolled in the Rolls Chapel Office, April*, 1832.]

Specification drawn by Messrs. Newton and Berry.

To Henry Brewer, *of Surrey-place, Old Kent Road, in the parish of Saint George, Southwark, in the county of Surrey, wire weaver, for his having invented or discovered certain improvements in machinery or apparatus for making paper.*—[Sealed March 15th, 1832.]

These improvements in machinery or apparatus for making paper, consists of two parts—first, a peculiar construction of sieve or strainer, to intercept and arrest the knots, lumps, and other matters which may be mixed with the fine fibres of pulp prepared for making paper; and, secondly, the adaptation of such sieves, in combination with other apparatus for manufacturing paper, both by machinery and by hand.

The sieves or strainers are formed, by combining a series of round wires or rods, which are placed side by side in parallel positions at very small distances apart, (the width of the spaces between the wires being dependant upon the intended quality of the paper to be made). These rods or wires may be secured to a frame in any convenient way, that is, either by screwing, rivetting, soldering, or otherwise fastening their ends to metal bars, rods or plates, and strapping the rods by means of their strips of plate metal, laid across upon their surfaces.

Plate XVI, fig 1. represents a plan or horizontal view of part of one of these improved sieve bottoms; figs. 2, and 3, are sections of the same taken edgeways. These figures show the manner in which the wires or rods are connected to form the sieve; but the Patentee states, he does not intend to confine himself precisely to this method of connecting them, as other modes might answer equally well. Neither does he intend to limit himself to the employment of round wires solely, as eliptical, triangular, or other shaped rods, bars, or wires would answer the purpose, provided that their upper surfaces, are not perfectly flat. Neither does he intend to confine himself to any particular size of wires, bars or rods, to be used for the purpose of making these sieves, but considers that rods from one eighth of an inch to three eighths in diameter or thickness would be found most generally useful. The Patentee sometimes constructs the sieves by combining thin flat rods, but rounded on their upper and lower edges, and under some circumstances he proposes to make the sieve bottoms of rods or bars, shaped as above described, of glass or other materials, which may be less liable to corrode than metal.

The distances at which the rods or bars forming the sieve are to be placed asunder, must be dependant upon the fineness of the paper to be made, and therefore cannot be here stated; but the inventor considers for general purposes, (such as in making fine writing and printing papers) that they may be placed at from the fiftieth to the eightieth of an inch apart; he sometimes constructs the sieve bottoms with moveable rods or bars, as shown at fig. 4, which represents the under side of a sieve with its frame, each rod being connected to two parallel slides *a*, *a*, by pivot joints; one end of each slider *a*, is attached to the frame at *b*, *b*, by a pin or button passed through a slot in the slider, and fixed into the frame. The reverse end of each slider carries a small screw box turning upon a pivot, through which screw box the shaft *c*, *c*, passes, and on turning this shaft by its small thumb screws, or in any other convenient way, the sliders will move and bring the rods nearer together or farther apart.

The sieve bottom or strainer being thus formed, it is enclosed in a casing or box, open both at top and bottom, fastening the sieve or strainer in a horizontal position near the middle of the box, by screws passed through the sides of the box into the edges of the strainer frame; the sieve is then perfect, and ready to be adapted to machinery employed for making paper, which constitutes the second head of this invention, and is effected in the following way:—

Fig. 5, is a longitudinal section of a vat intended to be connected to a paper making machine, in which three of the sieves or strainers are employed; *a*, *a*, *a*, represents the thickness of wood forming the vat; *b*, *b*, *b*, are stretchers or transverse pieces extending from the sides of the vat, and holding it firmly together; *c*, *c*, *c*, are standards, supporting a rotary crank shaft *d*, *d*, *d*, which may be driven by a band and rigger *e*. The boxes or casings of the sieves are shown at *f*, *f*, and the wire strainers fixed in the boxes at *g*, *g*. Bridles *h*, *h*, are affixed to the sieves extending across them, and small arms *i*, *i*, hang from the sides of the bridles, which are intended to slide up and down in grooves and sockets of the stretchers *b*, for the purpose of guiding and steadying the sieves when they are put in motion. To the middle of each bridle, a crank rod *k*, is attached by a joint, and the reverse end of the rod is connected to the crank shaft *d*. It will now be seen, that on giving a rapid rotary motion to the crank shaft *d*, the sieves will be made to vibrate with a quick up and down movement.

The pulp or stuff of which the paper is to be made, being delivered from spouts or shutes, or by other convenient means, into the several sieves to be strained from its knots, lumps, or other gross matters, the shaking or vibratory action of the sieves, effected by the means described, assists in carrying the fine fibres of the pulp through the open spaces between the wires, while the knots and lumps are retained in the sieves, and the pulp so strained, flows away through the aperture *l*, shown at the bottom of the vat, in the transverse section fig. 6, and over the lip *m*, whence it proceeds down the inclined plane *n*, to the wire web of the paper making machine.

The Patentee states, that, though he has shown four sieves connected to a rotary crank shaft, he does not intend to confine himself to that precise number, in the construction of a straining apparatus for a paper making machine, as one or more sieves, constructed as above described, having the shaking or vibrating action, would answer the purpose.

This apparatus for arresting the knots or lumps in the pulp for making paper, will work in a paper machine vat of any depth, but the Patentee proposes generally to place it in a vat of nine inches deep, as the action of the sieves sufficiently disturbs the pulp, and supersedes the necessity of a hog being placed in the vat.

Fig. 7, shews a mode of adapting these improved strainers to a vat in which paper is to be made by hand moulds; *a*, *a*, is the vat shewn in section, containing the pulp as usual, from which vat the pulp is taken by dipping moulds into it in the ordinary way of making paper by hand; at the bottom of this vat a hog *b*, is employed for the purpose of agitating the pulp; *c,* is a sectional representation of the vat and strainer described above and shown at fig. 6, in which the sieves are suspended from a crank shaft, or may in any other way receive the up and down vibratory motion for the purpose of sifting the pulp. The pulp may be supplied from a chest as at *d,* and passed through a cock into a trough *e,* by which it is conveyed to the strainers.

A pipe from the bottom of the vat, leads into a lifter box *g,* shown also in section, which is designed to convey thin pulp into the sieve, to dilute that which is delivered from the chest. This pipe also enables the small lumps, called rolls, produced in the vat to be re-sifted. The pressure of the pulp and water in the vat *a,* forces the pulp up the pipe *f,* into the lifter box, from whence it is taken by the rotary lifters *h, h, h,* and discharged into the trough *e,* where it runs down and mixes with the thick pulp from the chest as before said. By these means the contents of the vat *a,* is completely re-sifted in the course of about every hour. In this figure there are shown several parts and contrivances commonly known and employed by paper makers; and to the invention of which the Patentee lays no claim, but states in conclusion that he does claim their combination with his improved sieves, for sifting or straining the pulp from knots and lumps when applied to making paper by hand; and that he does not intend to confine himself to the particular arrangement of the apparatus, as shown in this figure, as that must be subject to considerable variation, acccording to the convenience of premises in which it is to be placed; and he therefore claims the employment of the pipe *f,* and lifters *h, h, h,* to carry up the pulp from the bottom of the vat, in whatever manner the same may be arranged in connection with his improved sifters. — [*Inrolled in the Rolls Chapel Office Sept.* 1832.]

Specification drawn by Messrs. Newton and Berry.

To WILLIAM DAY, *of Gate-street, Lincoln's Inn Fields, in the parish of St. Giles in the Fields, in the county of Middlesex, Lithographic printer, for his having invented or discovered certain improvements in the construction of printing presses.*—[Sealed March 22d, 1832.]

THE improvements in the construction of printing presses specified under the above patent, have for their object a means or mode of relieving any extraordinary resistance that may occur when the power of the press is brought into operation in the act of giving an impression, which is accomplished by affording a small degree of elasticity in the pressure, through the peculiar construction of the framing of the press and its attachments.

The method in which this is effected, is by constructing the standard or frame of the press in two detached portions, that is, forming the upper parts of the side standards with the cross head in one piece, and the lower parts of the side standards and the bed of the press in another piece, thus separating the frame of the machine about the middle, in a horizontal direction. These two parts of the press are connected, so as to form the entire frame by means of pins passed through sockets with powerful springs, in the manner shown in Plate XVI, figs 8, and 9. Fig. 8, is a side elevation of one of these improved presses designed for lithographic printing; fig. 9, is a back view of the same; *a, a, a,* is that portion of the standard with its cross head which constitutes the upper part of the frame; *b, b, b,* is the other part of the frame, consisting of the lower portions of the standards and the bed. These two parts of the frame are connected by pins passed through ears *d, d,* extending from the upper portion of the standards, and similar ears *e, e,* extending from the lower portions of the standards.

The upper end of each pin is confined by a screwed cap, and round each pin below the ears *e,* a helical spring *g,* is placed, which is confined in that situation by the nut *h,* at bottom. When the press is not in action, as shewn in fig. 8, the force of the springs keeps the two parts of the frame close together, but when the power of the press is brought into action by running the stone in as at fig. 9, then the resistance causes the upper part of the frame to rise, which it is allowed to do by the compression of the springs.

The Patentee desires it to be understood, that although he has exhibited two springs on each side of the press, he does not intend to confine himself to any precise number, neither does he consider it a matter of any importance whether the springs stand above or below the ears of the frame, but observes, that they must be made capable of adjustment as to their elastic force. He has not particularly described the parts or mode of working a lithographic press, as machines of that kind are already well known; and lastly states, in conclusion, though he has only shown in the drawing a press capable of lithographic printing, yet it will be obvious that presses for printing from types, blocks, or plates may be constructed in a similar manner, that is, by separating the frame into two parts, and connecting the parts by springs.—[*Inrolled in the Rolls Chapel Office, Sept.* 1832.]

Specification drawn by Messrs. Newton and Berry.

To John Day, *of Birmingham, in the county of Warwick, brass-founder, for his having invented an improvement in the manufacture of cocks, used for the stopping and drawing off gas and water, and for other purposes for which cocks are now used.*—[Sealed March 15th, 1832.]

This improvement in the manufacture of cocks used for stopping and drawing off gas and water, and other purposes for which cocks are now used, applies to that kind or description of cocks commonly called slide or valve stop cocks, and consists of an addition to, or an improvement in the construction of the parts of these kind of cocks by which more perfect air or water tight joints are obtained in the cock, both in the barrel and mouth piece than heretofore made in cocks of the like description.

Plate XVI, fig. 10, is a vertical section, taken longitudinally through a valve stop cock, with this improvement adapted to it, and showing the valve or stop down upon its seat, and the aperture of the cock closed. Fig. 11, is a similar section, with the valve or stop raised from its seat, and the water way or aperture of the cock open. The same letters of reference are marked upon corresponding parts in these and all the following figures belonging to this invention: *a, a,* is the barrel of the cock; *b,* the valve or stop; *c, c,* is a partition, or valve seat, placed in the end of the barrel. Through this partition the way or opening of the cock is made, and upon it the valve or stop rests when the cock is closed; *e,* is the mouth piece or spout of the cock, which is made separate from the barrel, and is connected to it by means of the collar *f,* which has a screw formed upon its inside, taking into another formed on the outside of the barrel. This screw collar embraces the mouth piece, and presses the flange or rim upon its top part up against a ring of packing, formed of leather, cork, Indian rubber, or other fit and proper elastic material, and placed between the flange or rim of the mouth piece *b*, and the underside of the partition *c*; and on the collar being screwed up tight, it compresses the elastic packing between the surfaces of the mouth piece *c*, and partition, thereby forming an air tight joint. This collar of elastic packing is shown detached in fig. 14, and in fig. 13, it is shown placed upon the flange of the mouth piece *e*, within the collar *f*, ready to be screwed up to the under side of the partition *c*. Instead of this collar being attached to the barrel by the screws above described, it may be connected to it by screws passed through ears or lugs, formed upon the collar, and screwed into corresponding parts upon the barrel, or in any other convenient manner, which will allow of the joint being tightened when necessary.

In order to open this description of cocks, the valve or stop *b*, must be raised, which is effected by the following means:—Upon the upper part of the mouth piece *e*, is a cross bar, having a female screw formed upon it; from the underside of the valve or stop descends a short rod, having the male screw *i*, upon its end, which takes into the female screw upon the cross piece, and on turning the mouth piece *e*, partly round by the fingers, a key lever, or any other convenient means, the female screw will cause the screw *i*, to rise, and with it the valve *b*, into the position shown in fig. 11, and thereby open the water way of the cock; the valve being kept from turning round with the mouth piece, by means of the studs or pins *k*, *k*, moving in slots on the inside of the barrel, as shown in the horizontal section, fig. 14; taken through the barrel, just above the valve seat; or, by any other convenient means, as that of forming the valve of a square, or other proper form, working in corresponding parts in the barrel; or, by forming the guide of any other form than cylindrical, which will prevent the valve from moving round, when the mouth piece is turned.

On turning back the spout into its former position, the valve will be brought down upon its seat, and the cock closed.

Although the elastic packing is shown in the figures as moving with the valve as it is raised or depressed, yet it may be found desirable to let it rest always upon the partition *c*, the valve moving up and down, independent of it.

Fig. 15, shows this improvement adapted to a slide stop or valve; *a*, is the barrel; *b*, the valve or slide, which is mounted upon the partition *c*, turning upon a pin or stud *n*, and kept in its place, by means of a screw-nut, pin and collar, or any other convenient means. In order to open this kind of cock, the slide or stop must be moved partly round, in order to bring the opening *o*, in it, over the opening or way of the cock, (see the horizontal sections, figs. 16 and 17;) fig. 16, showing the cock closed and fig. 17, open.

This movement of the slide is effected by turning the mouth piece *e*, partly round, as in the former instance. The stud or pin *r*, projects from the under side of the slide through the water way or opening of the cock, and into the groove, formed in the cross piece *t*, upon the top of the mouth piece, as shown in the detached top, view fig. 18.

This connection will cause the valve or slide to partake of any motion communicated to the mouth piece; but it may also be obtained by forming the groove in a projecting ear on the inside of the mouth piece. It may be found desirable, to raise this kind of slide valve a little, as it is moved round to open the cock, which may be done by forming a slight screw upon the pin or stud *n*, and valve, which will cause it to rise, as it is turned round by the movement of the mouth piece, and thereby relieve the packing of the friction which would otherwise take place between the surfaces as they move one upon the other.

It will be obvious to all competent persons, that the cocks described under the foregoing figures, are well adapted for that description of cock or valve, called fire plugs, to be fixed in the water mains, in streets, for the supply of water upon the surface of the ground, and when used for that purpose, the Patentee proposes to form the mouth piece of a square, octagon, or other form; into or over which a key may be placed, to turn the mouth piece round, and open or shut the cock.

Fig. 19, shows a section of a portion of the ground, with a water main *a, a,* and the cock *b*, upon it; *e*, is the mouth piece, which may have a small clack shutter *u*, turning upon a hinge joint upon the top, to prevent the mud or dirt getting into the mouth piece, or it may be protected in any other way; *v*, is a key fitting within the mouth piece by which it may be turned, and the cock opened and shut.

Fig. 20, is a longitudinal section, taken vertically, showing the improvement adapted to another description of slide stop cock; *a*, is the barrel; *b*, the valve, having the elastic packing, fixed in or on one of its sides, and moving upon the surface of the partition *c*; *g*, is the elastic packing fixed in the cock, independent of the slide, and is pressed up against the back side of the slide, by the screw formed upon the mouth piece *e*, as shown in the figure. The slide *b*, is raised and lowered by means of the screw *i*, taking into the female screw within the barrel *h*, which is turned round by means of the key *w*, backwards and forwards, thus raising and depressing the slide *b*, and opening and shutting the cock; the collar *x*, upon the barrel keeping it in its proper place as it is turned round. Fig. 21, shows the cock open, and fig. 22, the elastic packing *g*, detached.—[*Inrolled in the Rolls Chapel Office Sept.* 1832.]

Specification drawn by Messrs. Newton and Berry.

To THOMAS GAUNT, *of Chapman-street, Islington, in the county of Middlesex, gentleman, for his having invented or found out a certain improvement or improvements in gaiters or spatterdashes.*—[Sealed 27th March, 1832.]

THESE improvements in gaiters or spatterdashes consist in peculiar methods of forming or constructing such coverings for the legs, for the purpose of shielding the wearer from mud and wet either in walking, or riding on horseback; a principal object being a simple and easy mode of attaching and detaching the said gaiters or spatterdashes, in order to prevent hindrance and trouble to the wearer.

The Patentee proposes to make these improved gaiters or spatterdashes of some stiff material, such as stout leather, japanned or varnished on the outer surface, or they may be made with pasteboard or cloth stiffened and painted, but he states he does not intend to confine himself to any particular material; springs, which are proposed to be of thin steel plate, are attached to the inner parts of the gaiters or spatterdashes for the purpose of causing them to bind tightly to the leg, which in a great degree prevents the necessity of other modes of attachment or fastening.

In order to give a more perfect explanation of this invention, the Patentee has attached to his specification representations of his improved gaiters or spatterdashes, but which of course are subject to some slight variations in form, according to the pleasure or taste of the wearer.

One of the forms is in fig. 5, Plate XVII, where it will be seen that the hinder part of the leg only is shielded: this is constructed for the convenience of walking in wet and dirty weather, and is intended to cover about half the leg; indeed it may be described as exactly resembling the back part of a stiff straight Hessian boot, the front part of the boot being removed at the side closings or seams.

In two or three places at the inside of the gaiter or spatterdash is affixed springs, shown by dots in the figs. but represented detached, and in perspective at fig. 6. These springs may be by any convenient means attached to the lining, or to the inner surface of the leather or other material; and when the gaiter or spatterdash is put upon the leg, the springs must be forced open, which on again collapsing, will bind the gaiter tightly to the leg of the wearer. It may however be desirable as a further security of attachment, to have a fixed strap carried under the sole of the boot or shoe next to the heel, and also a strap and buckle passed over the instep, which will keep the gaiter or spatterdash in its place.

In constructing gaiters or spatterdashes for riding on horseback, the Patentee prefers making them to enclose the leg completely, as shewn at fig. 7. The springs allow of their being opened when put on the leg, and collapsing to hold fast as before described, The form of this gaiter or spatterdash may be that of a stiff Hessian boot, or any other fashioned stiff boot that might be desired, and the opening may be on the side, as shown with a flexible tongue over the instep, or it may be made to open in front if that should be preferred.

These improved gaiters or spatterdashes may be put on or off in a moment without the trouble of buttons or laces, and being made with polished, japanned, painted, or varnished external surfaces, they may be rendered clean by a sponge and water without the trouble of blacking.—[*Inrolled in the Rolls Chapel Office, September,* 1832.]

Specification drawn by Messrs. Newton and Berry.

To BENNET WOODCROFT *of Manchester in the county palatine of Lancaster, printer, for certain improvements in the construction and adaptation of a revolving spiral paddle, for propelling boats and other vessels on water.*—[Sealed 20th September, 1832.]

THE improvement specified by the Patentee under the above patent, consists in a spiral paddle made of wood, metal, or any other suitable material, by the revolution of which boats or other vessels may be propelled on water, and is of the following construction: a spiral worm blade, or screw, coiled round a shaft or cylinder of any convenient length and diameter, in such form that the angle of inclination which the worms make with the axis of the cylinder continually increases, and the pitch or distance between the coils, or revolutions of the spiral, continually increases throughout its whole length. The effect of which construction is as follows:—

On the spiral paddle being made to revolve in the water, the commencement of the spiral blade, or that part of it which forms the greatest angle with the shaft, acts upon the water, and gives to it an impetus or motion towards the back end of the paddle, thus creating a current in the direction of the spiral. If this current were to reach the succeeding or following parts of the spiral paddle, before those parts take their action upon the water, such following parts would move in or keep pace only with the current, and therefore meet little or no resistance from the receding water, and a part or the whole of their action would be lost, or without effect. But by progressively elongating the pitch of the spiral, each successive part of the spiral begins to act before it is overtaken by the current given to the water by the action of the preceding part of the spiral, and consequently every part meets resistance from the water, and thereby gains a portion of propelling power.

Fig. 1, Plate XVII, is a side view, and fig. 2, a stern view of a steam boat, with two spiral paddles *a, a,* applied to it, one on each side, with their spirals formed in opposite directions, one as a left and the other as a right hand screw. These paddles are placed with their axles horizontally in the water, and parallel to the direct line of motion of the vessel, that end of each spiral which presents the shortest pitch, or quickest curve being next to the bow of the vessel.

The paddles are so placed that the lower edges of the spiral are a few inches above the level of the bottom of the keel of the vessel, and their diameters are such that the upper edges of the spiral shall be a few inches below the surface of the water, when the vessel is carrying its usual burden. Hence the draught of the vessel, or the depth at which she floats when loaded, regulates the diameter of the spiral paddle, when intended to be employed under total immersion. The length of the spiral paddles may be varied according to the power required.

The shaft *b*, of each paddle is supported upon a neck or pivot at each end, and works in carriages, or brackets marked *c*, *c*, which are firmly bolted to the side of the boat; *d*, is a crank fixed to the back end of the shaft of each paddle, from which a connecting rod *e*, passes upwards through the sides of the vessel, and communicates with the steam engine or other prime mover in the vessel.

When the vessel is to be propelled, the spiral paddles are made to revolve in opposite directions, by any of the ordinary means. And as they revolve in contact with the water, the spiral paddles and the water act together on the principle of the nut and screw, the water being the nut, and the paddle the screw, and the vessel thus receives a progressive motion through the water.

The ratio of motion thus obtained will depend upon the speed at which the spiral paddles are made to revolve upon their axles, and the power of propelling upon the diameter and length of the spiral paddle, together with the ratio or degree of the increasing inclination of the spiral blades towards the axles of the paddles. The spiral paddles are represented in the figs. 1, and 2, as placed in recesses in the sides of the hull of the vessel.

This mode of applying the paddles affords a protection to them from injury, and causes the vessel to which they are applied to occupy less room in width. But if this mode should cause the vessel to draw more water than the navigation will admit, the paddles may be partly let into the side, or not let in at all, in which cases the paddles should be protected by a frame or overhanging deck.

These spiral paddles may also be placed under the stem of the vessel instead of at the sides, as seen in figs. 3, and 4, where a part of the hull is removed, and the paddles *a, a, a, a,* are introduced into the space, and are firmly fixed to the boat and connected with the steam engine by the suitable intervening machinery. A protection is also by these means afforded to the paddles, without augmenting the width of the vessel. If the draught of the vessel is great, this combination may be used with good effect, because when the paddles are turned in the direction of the arrows, the surfaces of the spiral worms will act against a column of water in a manner approximating to the action of the piston of a forcing pump. The Patentee then proceeds to describe several other dispositions of these improved paddles, as adapted to different boats or vessels of greater or less draught or burden, and also the manner of generating or obtaining the proper curve and increase of the rake of the coil of the paddle, but which it is not necessary for us to describe; and then states, in conclusion, that although he considers a spiral blade, produced as described in his specification, the best adapted for a paddle for propelling boats or other vessels on water, yet he does not confine himself to that or to any particular ratio or degree of increasing pitch, or inclination in the spiral blade of the paddles; but claims as of his invention the construction and adaptation of a spiral paddle, in which the pitch or inclination of the spiral blade to the axis of the paddle continually increases, whatever be the ratio or degree of such increase.

That although he has described several combinations of these improved paddles, in order to illustrate the use and employment thereof, for the purpose of propelling boats or other vessels on water, yet he does not confine himself to any particular arrangement or combinations of these paddles, nor does he confine himself to any particular number of paddles to be so employed, inasmuch as these improved paddles may be employed for the purpose aforesaid, in various arrangements and combinations, and either singly or in combinations of two or more. —[*Inrolled in the Rolls Chapel Office, September,* 1832.]

Specification drawn by the Patentee.

To WILLIAM WELLS, *of Manchester, in the county of Lancaster, machine maker, for a new and improved method of making and constructing gig machines, otherwise called raising machines, or machines for raising the nap or pile of, and brushing and dressing woollen and other cloths.*—[Sealed March 8th, 1832.]

THE machinery described in the specification of this Patent is an apparatus by which a more perfect action of the teasles or brushes can be obtained upon the pile of the cloth, by a straight perpendicular motion, than by the ordinary rotary motion of the teasles or brushes in the machines most commonly used, and consists of a frame work, having a D shaped groove in it, which gives that motion to the teasle, rods, or brushes, by means of a pin upon the arms of the teasle frames, which works in the groove, these arms sliding in grooves in the arms of a rotary drum.

In Plate XVII, fig 8, is a side view of this apparatus; fig. 9, is a similar view, taken in the opposite direction. The machine may be driven by a strap leading from any first mover to the pulley *a*, which is fixed on the shaft *b*, also carrying a pinion *c*, working into the wheel *d*, thereby giving motion to the shaft *e*, in the direction of the arrow, on which is placed, the revolving cylinder *f*. In each side of the cylinder *f*, are six hollow cast iron arms *g*, *g*, which are made perfectly true within, in order to allow the sliding arms, *h*, *h*, which work in them, to advance, and recede freely, as they are carried forward by the cylinder *f*, and directed in their operative motion by the D or eccentric groove *i*, *i*, in the frame work, and the friction pins *j*, *j*, The groove *i*, is cast in the frame, and runs parallel with its outer rim; a section of one of the hollow arms *g*, and the sliding arm *h*, is shown on a larger scale at figure 10, a horizontal view of the same at fig. 11.

On the end of the sliding arm *h*, is screwed a small casting *k*, in which is fastened the friction pin *j*, in this piece *k*, is a chase mortice to receive the flange of what the Patentee terms the button *m*; immediately opposite the flange and in the inside of the button is a circular hole, into which a steel pin enters firmly attached to the lower side of the staple piece *n*, on the teasle frame *o*; by means of the button *m*, and the sitting screw *p*, the lower side of the teasle frame can be elevated or depressed at pleasure so as to throw the teasle into the best position for operating on the surface of the cloth *q*, *q*. By these means the teasle frame *o*, is moved forward by the button, in the direction of the eccentric D shaped groove.

It will, of course, be understood that either teasels, cards, or brushes may be fixed in the frames *o*, as the nature of the work may require; *r*, is a wrought iron staple, which encompasses the end of the teasle frame; *s*, is a friction pin which is fastened into the staple *r*, and works into the groove *i*, in the lower side of the staple; there is also a steel pin, which rides in the button *m*, as before mentioned.

The Patentee, after having described as above all the parts of the machine which have any claim to novelty, proceeds to describe the other parts of the apparatus which are necessary to the working of the machine, and are shown in the figures but are in common use in other machines, and consequently are not new, and are not claimed by him as his invention; a pulley 1, is placed on the shaft *b*, behind the rigger *a*, for the purpose of giving motion to the circular brush 2, which is used for cleaning the teasles while the machine is at work. This circular brush is cleaned by running against a small brush fixed underneath it at 3; 4, 4, are drawing rollers; 5, is a bevel wheel on the cylinder shaft *e*, which by the diagonal shaft 6, gives motion to the drawing rollers 4, 4, connected by the spur wheels 7, and the strap 8; 9, 9, are rollers over which the cloth passes for the purpose of being laid to the machine, and are adjusted through the screws and slides 10, turned by handles; 11, is a tension roller, which is retarded by a friction hoop, and a lever and weight; 12, are also tension rollers for holding the cloth as may be required; 13, is a cutting frame, which is worked by the wheels 14, and 15, the wheel 15, being loose on its centre. On the handle 16, is a nut screw, for the purpose of relieving the diagonal shafts 6, from the drawing rollers 4, when necessary.

The Patentee then states that he claims first as his invention the described method of adjusting the teasle frame *o*, by the button *m*. Second, the motion as produced by the combination of the revolving cylinder *f*, the sliding arms *h*, and the eccentric grooves *i*, as before described. Third, the application of the said motion to all purposes of raising, dressing, or brushing woollen or other cloths requiring such processes.—[*Inrolled in the Inrolment Office, May,* 1832.]

Specification drawn by the Patentee.

To Joseph Alexander Taylor, *of George-street Hanover-square, in the county of Middlesex, Esq. for an improved whip stick or cane, to be used when riding.*—[Sealed 5th June, 1832.]

This invention, as described by the Patentee, consists in the addition of a long tuft or tassel of hair to the handle of whips, sticks, or canes, used when riding, for the purpose of enabling the rider to relieve his horse from the annoyance of flies.

Fig. 12, Plate XVII, is a section of the handle of a riding whip, made hollow to receive the tail of horse hair *a*, which is shewn in the figure drawn out ready for use; the tail, which when made tapering, must always protrude a little beyond the end of the handle, or the hair will be deranged in pulling it out for use; *b*, is a metal tube, having two friction rollers at *c*, for the check string *d*, to work between; this string is fastened at one end round the whip handle, and the other end fastened to the inner tube or slide *e*, into which the tail of horse hair is firmly secured by cement, which tube should be made to slide freely in the tube *b*, and is kept from drawing out of the tube by the screw ring or collar *f*, which, when the hair has been drawn through it, and the sliding tube *e*, inserted in the tube *b*, may be screwed on to the end of the tube or whip handle.

When the tail is not required for use, it may be drawn by the string *d*, up into the handle, the end projecting a little from the end of the handle, by which it may be drawn out as required.

The Patentee states in conclusion, that the long tufts or tail of hair may be made to slide in and out of the handle, without the use of the string *d*, by adding a weight to the sliding tube *e*, sufficiently heavy to pull the tail into the handle, by merely holding the whip in a perpendicular position; *and further,* that the tail of horse hair may be attached to the handle of the whip, without being made to slide into it; and claims, as his invention, the addition of a long flowing tuft or tail of hair to the handles of riding whips, sticks, or canes.—[*Inrolled in the Inrolment Office, July,* 1832.]

To Grant Preston, *of the Minories, in the city of London, nautical brazier, for an improvement or improvements in ships' compasses.*—[Sealed May 26th, 1832.]

The invention described in the Specification of the above Patent, consists, of improvements or additions to the common compass, to prevent the vibration to which the compass is now subject, and which tends to prevent the correct action of the needle; and, consists of tubes or rings, either, attached to the ordinary cap which contains the agate or to the card by arms. The needle point or pin which supports the card passes up through these tubes, and when the card has a tendency to vibrate in consequence of any motion communicated to the vessel, the lower end of the tube or ring will come in contact with the pin and stop such vibration; at the same time, there will be sufficient play to insure the action of the needle.

Fig. 12, Plate XVII, represents a section of a common compass needle and card, having these improvements applied thereto; *a,* is the card and needle; *b,* the cap, which contains the agate; *c,* is the pin or needle point, on which the card and needle rests; *d,* is a small tube, which is screwed into, or otherwise fixed to the cap, and descends from it, encompassing the needle point *c*, or instead of using the whole of the tube, only a small part of its lower end, or a ring will answer equally well, which part of the tube or ring may be connected to the card by arms, as shown by dots in the figure, the object being that of preventing the vibration of the card, by the lower end of the tube *d*, coming in contact with the pin *c*, thus preventing further vibration than is necessary, to insure free action to the needle.

In compasses having a dipping needle, the needle is not affixed to the card, but rests on an axis supported by bearings affixed by screws to the card, and a circular plate affixed to the cap, receives the other end of the axis; there, are also two upright pieces affixed to the needle, through which the axis pass; by which means, the needle is permitted to swing up and down as is usual with this description of compass.

The Patentee states in conclusion, that he claims as his invention, the application of the tube *d*, whether the same be connected to the card by means of arms, or fastened directly to the cap, with a view to prevent the vibration of the card and needle, as above described.—[*Inrolled in the Inrolment Office, July,* 1832.]

To Hugh Bolton, *of Sharpels in the parish of Bolton-le Moors, in the county of Lancaster, carder, for an improvement in machinery used for carding cotton and and other fibrous materials*—[Sealed June 5th, 1832.]

This invention consists in an addition to the common carding engine, for receiving seed, dirt, and other extraneous matter from cotton and such other fibrous materials, while they are undergoing the process of carding, and consists in the the application of a knife edged blade to the carding machinery, and is furnished with a receptacle, which receives the said matter when so removed as aforesaid.

Fig 13, Plate XVII, represents an end of an ordinary cotton carding engine, with this invention applied to it; *a*, is the main cylinder; *b*, the feeding rollers; and *c*, the doffing cylinder. The additional box, and blade is shewn placed at *d*, in the part between the top cards marked *e*, and the doffing cylinder.

Fig. 14, shews this additional apparatus upon a larger scale; *d*, is a wooden trough, box, or receptacle of a triangular form, in order to fit the situation in which it is placed, the flat side being uppermost, and the two concave sides are placed towards the main cylinder, and the other towards the doffing cylinder; projecting arms extend from the trough *d*, to the framing of the machinery; *f*, is the metal knife edged blade also fastened to the framing, and bent or curved as shown in the fig. in order to bring its edge nearer than the trough to the material on the main cylinder of the machine.

The exact distance at which the knife edged blade should be placed from the points of the wire cards of the main cylinder depends in some measure on the nature of the material to be carded, and it will be easily ascertained by experience. But in all cases the Patentee recommends the blades to be applied as a tangent to the circle, or periphery of the carding cylinder, with the knife edge of the blade, set to meet the motion of the cylinder. In carding cotton of the quality called Orleans, the Patentee finds about one-sixteenth of an inch distance from the wire points on the cylinder to answer well; the blades should always be set parallel to the axis of the main cylinder.

In fig. 13, only one blade is shown, applied to a carding engine which is rather more convenient than a greater number, if the cotton or other fibrous material is sufficiently cleaned by its action; but where more blades are required, two or more of the top cards *e*, may be removed, and a succession of blades placed in their situations; but this addition of a greater number of blades, together with their relative position to one another on the cylinder, must depend on the construction of the carding engine and the nature of the material to be carded.

During the process of carding, the trough *d*, with the blade, is covered up by means of the lid *h*, which is attached by hinges or otherwise to the top rail of the trough *j*, to prevent the escape of the small portion of cotton or other fibrous material, which may be struck off by the knife edge of the blade, and may be removed from the box by the person employed to clear the top cards, as often as may be necessary, as also the seed, dirt or other extraneous matter, which collects at the bottom of the trough or receptacle.

The knife edged blade, is screwed to the front of the trough as well as fastened at its ends to the framing of the machine; this is necessary if the blade is not made very strong in the back, as the more firmly it is kept in a perfectly straight line across the cylinder the better it will act. The Patentee states that although he considers the situation of the blade as shown in fig. 13, best suited for the purposes of his invention, yet he is aware that it might be placed elsewhere on the carding engine with very good effect.

And he claims as his invention the application of a knife edged blade, furnished with a trough or receptacle to the machinery used for carding for the purpose of removing, and collecting seed, dirt, and other extraneous matter, from cotton and other fibrous substances, while they are undergoing the process of carding.—[*Inrolled in the Inrolment office, August,* 1832.]

To Samuel Hall, *of Basford, in the county of Nottingham, cotton manufacturer, for his having invented an improved piston and valve for steam, gas, and other engines, also an improved method of lubricating the pistons, piston rods, and valves or cocks of such engines, and of condensing the steam, and supplying water to the boilers of such steam engines as are wrought by a vacuum produced by condensation.* —[Sealed 22d December, 1831.]

The several improvements described by the Patentee in his Specification of the above inventions, are the result of many years' practical experience in the use and working of highly elastic steam, and its effect upon engines and machinery, as most of our readers will be aware from our former reports and notices of Mr. Hall's inventions. The improvements as stated in the title of this Patent, apply to various parts of the steam engine, and are divided into five separate heads; consisting, first, in improvements upon, or in the construction of the pistons of steam engines, by which the steam is made to produce a more perfect packing between the piston and its cylinder; the elastic force of the steam being allowed to act upon the packing in the piston, and produce what may be called, an adjusting packing, according to the pressure of the steam in the cylinder; secondly, in improvements in the construction of the slide valves, by which it is allowed to adjust itself on all its sides in contact with the seat or face plate to any unevenness in either the face plate or valve, arising from its warping and unequal expansion of the metal.

Thirdly, in the lubrication of the engine, piston, cylinder, &c. by causing a stream of oil constantly to pass through the working cylinders, pistons, &c. by which the packing will be greatly preserved, and the friction much reduced; and further in separating the oil or other lubricating material from the condensed steam, and vapour after it has passed from the engine, in order that it may be used over again.

Fourthly, in improvements in the condensation of steam by passing it very slowly through horizontal pipes, partly filled with condensed water, and fifthly, in causing the boiler to be supplied with the water arising from the condensation of the steam, by the refrigerating apparatus, described under the fourth head; such water being used over and over again, thereby preventing the necessity of injecting impure water into the boiler.

The improved piston consists of three parts; a middle block, a bottom, and a cover. Fig. 1, Plate XVIII, is a section of the piston, showing how the bottom *a*, and cover *b*, are attached to the middle block *c*; the bottom is attached to the middle block by six screws, two of which, *d*, *d*, are shewn in section. The nuts *e*, being put upon the screws *d*, and secured in their places by lock nuts *f*, suspend the bottom, and prevent its lowering more than is required, but allow it when at work, and pressed upon by the steam, to rise and approach towards the middle block *c*. Fig. 2, is another section of the piston, showing how the cover is brought down and made to approach towards the middle block; six screws, two of which *g*, *g*, are shown in section, are screwed into the bottoms of recesses formed in the middle block alternately between the holes through which the screws *d*, are passed to support the piston bottom; the perforated bosses of the cover *b*, enter these recesses, the screws *g*, passing into them; nuts *h*, are then put upon these screws to force the cover down towards the middle block, compressing the packing *i*, *i*, which may be of hemp or cotton. In order to prevent the steam from passing by the cover, plugs *j*, *j*, are screwed into the holes through which the nuts *h*, *h*, are introduced, and stuffing is put into the recess *k*, round the piston rod *l*, and pressed into tight contact with it by a ring of metal; both these figures of the piston, are shown in one cylinder A.

When the piston is packed and put together, there are spaces left of about three-fourths of an inch between the middle block and the bottom and cover, to allow each of them, when pressed upon by the steam, to approach towards the middle block, and to cause them, by their inclined planes, to force the packing outwards; thus the pressure of the steam against the bottom and cover acts in the nature of an adjusting spring, to press the packing more or less forcibly into contact with the cylinder, according as the pressure at which the engine is working is greater or less. It is evident that the higher the pressure is of the steam, the more forcibly ought the packing to be pressed against the cylinder; this is effected in a very accurate manner by this piston, even in engines working expansively, in which the stroke of the piston begins with very high and ends with low pressure; for in the same ratio that the pressure of the steam on the piston is reduced, will the force with which the packing is pressed outwards, against the cylinder, be decreased.

The second part of these improvements, is upon the valves, and is applicable to all those coming under the denomination of slide valves. That shown in figs. 3, 4, and 5, is a flat valve, that alternately connects the passages from the upper and lower ends of the cylinder with the steam pipe and the eduction pipe. It consists of two parts, viz. the slide or sliding frame, and the seat plate on which it works. Fig 3, shows the face of the sliding frame; fig. 4, is a section of it, cut across in the situation of dotted lines A, B, in fig. 3; and fig. 5, is a transverse section. There are grooves formed in the ends and sides of the sliding frame; the side grooves must each have a flat metallic bar of the length and width thereof inserted at the bottom, the grooves must then be filled with packing, which may be made of strips of cotton or linen cloth; the grooves in the top and bottom of the frame must, in like manner, have metallic bars and strips of packing inserted into them the width of the grooves, and of such lengths as to abut up to the bars and packing in the side grooves; the tops and bottoms are then to be faced with plates of steel, having ribs at their backs, which enter into the grooves to be pressed upon by the packing; fig. 4, is a section of the bars *m*, the packing *n*, and steel face plate *o*, of the top and bottom grooves; and fig. 5, shows sections of the bars *p*, and packing *q*, of the side grooves; fig. 6, is the seat plate, made of steel, on which the sliding frame works. In fig. 4, they are shown in section taken in the situation of the dotted lines from B, to C, in fig. 6.

This seat plate is perforated with channels *s*, so as to render it hollow, and they are pervaded by steam, by means of the holes *t*, *t*, in the face of the plate, which enter into them. The intention of the sliding frame is to enable each end and side of it to adjust itself to the seat plate, independently of the others, as it is difficult to make slide valves of the common construction (owing to their large working surfaces,) sufficiently accurate and steam tight, especially in high pressure engines. as they are warped and rendered uneven when heat is applied to them.

The intention of the perforations of the seat plate is to cause it to be pervaded by the steam, whereby it is prevented from otherwise becoming untrue; packing of linen or cotton cloth is inserted between the seat plate and the nozle or block of the cylinder to prevent the escape of steam.

The third part of this invention is the improved method of lubrication, and consists in the injection of an uniform stream of oil by a force pump, or other means, into the pipe leading to the working cylinder, or into the cylinder itself, and in a method of separating such oil from the water on leaving the engine, to repeat the lubrication, ad infinitum. In condensing engines this mode of lubrication cannot be practised well without the improved method of condensation, whereby no water but the distilled water resulting from the condensation of the steam enters the internal parts of the engine and mixes with the oil. In fig. 7, *a* and *b*, are vessels which are called separators, to effect the separation of the oil and water; *c*, is a perpendicular pipe, one end of it being open to the atmosphere and the other entering into the separator *a*, which is, as well as the other separator, filled with pure water up to the dotted lines; *d*, is a branch from the perpendicular pipe which, in high pressure engines, is connected with the eduction pipe of the working cylinder, and in condensing engines with the exit valve of the air pump.. The water, oil, &c. on leaving the engines, enter the perpendicular pipe in commixture with each other; such fluids as are gaseous escape through the upper end of the pipe into the atmosphere, and the water and oil descend through the lower end, whence (owing to their different specific gravities) the oil rises to the top of the separator, and the waters descends to the bottom and passes to the second separator *b*, in which any little oil which may be carried away with the water, undergoes, a second time, the process of separation. More than two separators may be used, if required, to effect an accurate separation of the oil; *f*, *f*, are pipes to connect the separators; *c*, is a pipe at the top of the first separator, which connected with the force pump, to return the oil to the engine as above mentioned, occasional additions only being supplied to replace any little waste that may take place in the course of working.

The fourth head of this invention is the improved method of condensation, and consists in avoiding the usual injection of cold water into the condenser; this is effected by a particular mode of using metallic surfaces, whether in the form of vessels, channels, passages, or pipes, their external surfaces being in contact with cold water; it consists in keeping them full of the water resulting from the condensation of the steam, which becomes the internal condensing water.

The Patentee states, that all attempts to attain the desideratum of condensing without injection water have hitherto proved abortive, owing to the rapidity with which steam passes through pipes or other apparatus, and its consequently not being in contact with metallic surfaces sufficiently long for condensation to be effected; but by his improved method of causing the steam to pass through the pipes or other apparatus in its condensed instead of its uncondensed state, it is nearly eighteen hundred times longer in its passage, and in contact with the metallic surfaces, than if it were to pervade them in the uncondensed state. And further, that his invention therefore does not consist in the application of metallic surfaces generally, but in the particular mode of applying them by keeping them occupied by water instead of steam. Fig. 8, is a longitudinal, and fig. 9, a transverse section of a system of metallic surfaces, which is called a refrigerator, in the form of pipes; *a, a,* are the refrigerating pipes; *b,* is a pipe, leading from the working cylinder to the condenser; *c,* is the condenser, being a chamber connected with the internal surfaces of the refrigerating pipes, by one end of each of them entering into it; *d,* is a similar chamber, but somewhat narrower, connected with the internal surfaces by the opposite ends of the pipes opening into it; *e,* is a pipe connecting with chamber *d,* to which the air pump is to be attached. These pipes should lie in as horizontal and level a position as convenient, and upon each end of every one of them must be affixed a cap. These caps are intended to cause the pipes to be occupied by water, as above mentioned, and not principally as is usual by steam. The caps effect this by retarding the passage of the water produced by the condensation of the steam (through the pipes). In the upper part of each cap, a hole or holes must be made, to allow the steam, water, air, and any other matter that may accompany them, to enter into the pipes, by the ends projecting into the condenser, and pass through them into the chamber *d.* The aggregate areas of the holes in the caps, on those ends which enter into the condenser should be about equal to the area of the pipe that conveys the steam from the steam cylinder to the condenser; and the holes in the caps on the opposite ends of the pipes, videlicit, those which enter the chamber *d,* should be considerably less The Patentee uses them of about one-tenth part of such area. Fig. 10, is a section of a portion of one end of a refrigerating pipe *a,* taken in the direction of the dotted line in fig. 11, which is an end view of one of the caps of the pipes. Fig. 10, shows the mode in which the refrigerating pipes are passed through and affixed to the two plates *f, f,* which form the ends of the refrigerator; *a,* being the end of a pipe; *f,* portions of the plates;

g, g, are the caps, which are put on the ends of the pipes.

The ends of the pipes at *f,* 1, in fig. 8, are screwed into the plate *f,* 1, and project through it sufficiently to receive the caps *g.* The holes on the outside of the plate, as well as the inside of the cap, are countersunk, so as to form a recess between them, to receive a cotton, hempen, or other ring of packing *h,* which being pressed very tightly by screwing the caps on the end of the pipes, and thereby forms a sufficiently steam-tight joint. The other ends of the pipes are passed through the plate *f,* 2, without screwing into it, and has two steam-tight joints made by countersinking the holes in the plate *f,* 2, on both its sides; one joint being made by the countersunk cap as before described; and the other by the countersunk nut *i,* on the other side of the plate. In the upper sides of the cap are formed the apertures *k*; *l, l,* is a cistern, which may be of any convenient shape and kind besides that shown, to contain the refrigerating pipes. A stream of cold water should constantly flow through it, and envelop the external surfaces of the pipes; *m,* is a pipe to conduct the cold water into the cistern; and there is another, not shown in the fig. by which the water is carried away; *n,* is a plate perforated with a great number of small holes, placed in the condenser to equalize the entrance of the steam into the refrigerating pipes, and prevent its otherwise rushing with violence into some of them, and scarcely entering at all into others.

The fifth and last head of this invention is the supplying of water to the boilers, and consists in effecting the repetition of the following routine of water and steam through the steam engine: the water with which the boilers are in the first instance supplied having issued from them in the form of steam, passes through the working cylinder, and is then re-converted (by the condensing process before described) into water, in which state it proceeds through the refrigerator, air pump, and separators; when being separated by the latter from the oil or other lubricating matter, it is again supplied to the boilers, instead of being taken, as is usual, for that purpose on quitting the air pump, without separation, and of course in commixture with the lubricating matter and any impurities contained in the injecting water.

The effect of this routine or method of supplying water to boilers is, that the same distilled and separated water repeatedly enters into them, instead of the mixture of water with lubricating matter and impurities when supplied to the boilers in the usual manner. The trifling waste of water necessarily arising from working, may be supplied by distilled or other sufficiently pure water. The Patentee observes that the water may be heated on its passage from the separators to the boilers, by the well known means of passing it through pipes placed within the condenser; and that the separators and refrigerating pipes, as well as the boilers, should be filled with pure water preparatory to the working the engines.

It is obvious that the five parts of this invention mutually assist each other. The packing of the piston and valve being of vegetable substances, would be liable to more or less rapid destruction, according to the pressure and temperature of the steam employed, were it not preserved by the ample lubrication described, but by such lubrication it will remain uninjured for many years. The lubrication cannot, in condensing engines, be effected without the method of condensation by which the injection of water into the condenser is avoided, and the supply of distilled water to the boilers is dependant upon the same process.

The Patentee states the advantages to be derived from the uses of this invention may be considered as follows:—

First,—The preservation of the packing of the piston and the more perfect action of the piston which is attained by causing the steam to act as an adjusting spring against the packing, and consequently to act as accurately after being used for years as it does at the commencement; whereas hemp, cotton, or other vegetable packing, in common pistons, becomes very imperfect, and allows the steam to escape long before repacking becomes absolutely necessary.

Secondly,—By the improved slide valve the steam is effectually secured by the facing or packing of the working face of the sliding frame by steel plates, and hemp or cotton packing, and by the compensating nature of the seat plate on which the sliding frame works, whereby the durability of the valve is greatly increased, and its becoming untrue by friction and unequal expansion, are prevented.

Thirdly,—As regards lubrication, the friction of the piston, both in the working cylinder and air pump, is nearly overcome, as well as that of the valves and piston rods, whereby a great saving of power is effected, and the cylinders and other parts of the engine are preserved.

The escape of steam by the working piston and valves is effectually prevented by the uniform and plentiful flow of oil, a stratum of which is formed and constantly floats on the upper side of the piston, hermetically sealing any passage between it and the sides of the cylinder.

Fourthly,—As relates to the modes of condensation and supplying water to boilers. The power required to pump the injection water out of a vacuum is saved, for the air pump is of much less than the usual size, the introduction of air into the condenser, (which is in combination with injecting water, and materially injures a vacuum,) is also avoided, as well as the pumping of it out of the condenser along with the injection water.

The injury done to the air pump, &c. by water impregnated with saline matters and other extraneous substances is prevented.

The destruction of the boilers and the slow generation of steam, consequent upon the disposition of such extraneous matters, is effectually avoided.—*Inrolled in the Inrolment Office, June,* 1832.

* * *

Patents granted in the United States of North America, in the year 1831.

For an improvement in the Cylindrical Sheet-iron Cooking Stove; **Emma Steinnour**, city of Philadelphia, February 3.

The petition informs us that the invention is an "improvement upon the cylindrical sheet-iron stove used in the burning of anthracite; by appropriating the heated air thereof, after it has passed through the body of the fire, to the purposes of roasting, boiling, baking, and performing a variety of culinary operations by means of different apparatus and fixtures."

The foundation of the apparatus is the ordinary round sheet-iron stove, lined with fine clay. Kettles with tubes projecting from their sides, are made to boil by passing these tubes through the sides of the stove. The heated air, instead of being at once conducted off, is to pass through a tube into a sheet-iron box, or roaster, in which meat, &c. is to be roasted. From this a pipe conducts the warm air into a hollow sheet-iron shelf, upon which plates, dishes, &c. may be placed, and from this it is finally carried into a flue, by a pipe. The top of the stove takes off, and may be replaced by an oven, or by boilers for vegetables.

The claims are to the mode of roasting by heated air; of boiling around or on the top of the stove, and at the same time of baking and roasting by means of heated air; for heating flat irons, broiling, frying, &c.

We have received assurances from persons who tested the goodness of this stove in their own families, and who are well qualified to judge of its merits, that it is well adapted to all culinary purposes; that it is very economical, and that the most delicate food does not acquire any unpleasant flavour by its exposure to the gas which has performed the office of combustion.

For an Inclined Water Wheel; William A. Squires, and Coral C. White, Ledyard, Cayuga county, New York, February 5.

This inclined water wheel is placed in the manner of the inclined wheel upon which horses, or other animals, are sometimes made to walk, and propel machinery. Buckets are formed around the periphery, on the upper face of the wheel, and the water is received upon its upper, and discharged on its lower edge.

When the water is low, and a greater power is wanted, it is proposed to place a horse upon the wheel, and thus to obtain the combined action of the animal and the water. When this is to be done the face of the wheel must be floored, and the flooring allowed to cover the inner ends of the buckets.

There is no claim made, and the patentee therefore supposes the whole arrangement to be new; in this however, he is in error. There has long been in the patent office a model of such a water wheel.

We do not perceive in what particular this wheel possesses advantage over other modes of applying water.

For an improvement in the Mill for Grinding Corn and other grain; **Elisha Bigelow**, city of Washington, D. C. February 11.

Should the utility of this invention be commensurate with its simplicity and the brevity of the specification, it will be almost invaluable. *To avoid prolixity,* we will give the whole description, as furnished by the Patentee.

"My improvement on the mill for grinding corn and all kinds of small grain, likewise plaster of Paris, may be applied to all mills which are now or may hereafter be put into operation. Make an aperture through one of the stones; it is thought best to make a number of appertures through the cap stone or runner, according to the size of the stones. By this improvement being applied, any required momentum may be given to the stones, and the atmosphere having a free circulation through the apertures will prevent the meal from clogging or heating." "Elisha Bigelow."

For a mode of constructing the Rotary Steam Engine, called the "Double Chamber Rotary Steam Engine;" **Joel Eastman**, Bath, Grafton county, New Hampshire, February 18.

The Patentee informs us that "the rotary or revolving part of this engine may be constructed in various ways, not essentially differing from other rotary engines; the distinctive character of my engine being the employment of two chambers upon the same shaft, by which the action upon the fixed heads, is rendered equable."

The steam is admitted and discharged through openings in the fixed heads; and to them are attached the metallic stops which fill the chambers, and cause the steam to re-act upon the valves. Instead of the ordinary stuffing, it is proposed to close the juncture between the revolving cylinder and the fixed head, by driving wood, endways of the grain, into a groove prepared to receive it, which being turned off, to run against the metal.

The claim is to "the employment of two chambers on the same shaft, in which the heads that form the exterior ends of the chamber are fixed, or stationary, and by the use of which two chambers the force or action upon each end is equalized."

For a Water Wheel for Mills, in which the floats work upon hinges or joints, and are enclosed within the rims of the wheel and a circular apron; **Joel Eastman**, Bath, Grafton county, New Hampshire, February 18.

"This water wheel may be made of cast and wrought iron combined; its diameter may vary from two to six feet. The rim of the wheel is to be partially surrounded by a circular case, or apron, which will confine the water within the rims, and between the buckets or floats. The floats are made to work upon joints or hinges, and the water is conveyed on to the buckets or floats, through a penstock or close trunk, extending the whole height of the fall. The buckets or floats are to be opened and closed by apparatus appended to the wheel, to the frame, or to the plumber block on which it rests."

The junctures of the revolving parts are to be closed by strips of wood, driven into grooves, as in the foregoing article.

The claims are to the application of a water wheel constructed as above described; that is, with floats or buckets, which are opened and closed mechanically, independently of the action of the water, and the confining the water within the rims, by means of a case or apron, whilst operating upon the floats or buckets.

The motion of the buckets upon their hinges is effected in a manner similar to that of the valves in several rotary engines.

For an improvement in Mortise Door Fastenings; LEONARD FOSTER, Boston, Massachusetts, February 25.

THIS is to be a substitute for the common mortise lock; but it is to be so constructed as not to occupy more than half the width, or thickness, usually required for such locks; adapting it, therefore, to thinner doors, and weakening the door much less than ordinary.

The bolt is to be shot forward either by a turning or sliding knob, which projects through the escutcheons. The escutcheons are to be made of metal plates, three inches square, and as the body of the lock is but two inches, the screws by which these are fastened enter the solid parts of the door, above and below the lock. On the inside of the door there is a small bolt which enters the main bolt, and secures it in its place. When it is desired to have the door to lock on the outside, a small lock, like those used for drawers, is fixed under the bolt of the mortise lock, which has a notch in it to receive the bolt of the small lock. The advantage, thus obtained, is the carrying of a small key instead of a large one. To enable the bolt to spring back as the door closes, the plate on the door post is made to slope, the thickness of the bolt itself not being sufficient for that purpose.

The claims are to the construction and arrangement of the various parts of the door fastening.

MISCELLANIES.

Chemical Agency of Light.--A series of experiments on the relations of oxalic acid to metallic oxides, conducted by J. W. Dobereiner, induces him to draw the inference that the chemical influence of light is very rarely analogous to that of heat, and that it is *sui generis* ;—that the one determines a contraction, the other an expansion, of the matter, and that the reductive action of light is a consequence of the contractive force of that agent, while the effect by which heat promotes combustion and almost every kind of chemical penetration, is the result of the dilatation of the matter occasioned by it. The cause of this opposition of effect is unknown, and we can scarcely hope to discover it when we reflect with what facility light is transformed into heat, and *vice versa.—Bib. Univ.*

Inflammation of Gunpowder under Water.—In the port of Penemund, (says Prof. Hunefeld of Greifswalde,) there was situated an enormous rock, covered with water about three feet, which was a serious impediment to the navigation. Efforts had been made, but in vain, to remove it by mechanical force, and it was not known by what means it could be blasted. The difficulty was at length overcome by Engineer Lubke.

A leaden tube, several feet long and closed at the lower end, was inserted into a hole, bored several years before, in the rock. A cartridge was pushed to the bottom, and in contact with the powder over it, a little piece of potassium. The upper part of the tube was funnel shaped, and contained a thimble shaped vessel filled with water, and supported in an upright position by a piece of amadou, which, by a simple arrangement, would, when burnt, allow the thimble to overturn. The amadou being set on fire, the workmen rowed off to a safe distance, and waited the event. The thimble being overturned, the water inflamed the potassium, and the latter the powder, and the explosion succeeded well. A second trial was equally favourable. The powder must be very dry, otherwise potassium will not inflame it; common gunpowder is generally too damp.—*Bib. Univ.*

New Patents

GRANTED IN ENGLAND IN 1832.

To Joseph Gibbs, of the Kent Road, engineer, and Augustus Applegath, of Crayford, both in the county of Kent, calico printers, for their invention of improvements in machinery for cutting out wood for carriage wheels, and for cutting and shaping the wheels.—22d Sept. 2 months.

To Charles Watt, of Chapham, in the county of Surrey, Surgeon, for his invention or discovery of a new or improved method, or progress of preparing tallow and stuff from fatty materials, and refining the same for the manufacture of candles, and other purposes.—22d Sep. 6 months.

To Joseph Anns, of Loose, in the county of Kent, paper maker for his invention of certain improvements in the construction of an apparatus to be employed in making paper.—29th Sept. 6 months.

To John Travis, the younger, of Shaw Mills, near Manchester, in the county palatine of Lancaster, cotton spinner, for his invention of certain improvements in machinery for roving cotton and other fibrous substances. —29th Sep. 6 months.

To William Palmer, of George-place, Old-street Road, in the county of Middlesex, candle maker, for his invention of improvements in making candles and candlesticks, or apparatus for holding candles.—29th Sep. 6 months.

To John Joyce, of Sidmouth-street, Gray's-inn-road, in the county of Middlesex, gentleman, for an invention communicated to him by a certain foreigner residing abroad, of a certain improvement or improvements in machinery for making nails, which invention he believes will be of general benefit and advantage.—29th September, 6 months.

To John Swan, of Basingstoke, in the county of Hants, brewer, for his invention of certain improvements in brewing.—Sealed 29th September, 6 months.

To Sherman Converse, of New York, in the United States of America, at present residing at Ludgate Hill, in the city of London, gentleman, for an invention communicated to him by a certain foreigner residing abroad, for "certain improvements in making or manufacturing metallic rails for the construction of rail roads."—29th September, 6 months.

To Joseph Gibbs, of Kent-terrace, Kent-road, in the county of Surrey, engineer, and Augustus Applegath, of Crayford, in the county of Kent, calico printer, for their invention of "certain improvements in steam carriages."—29th September, 6 months.

To John White, of the town and county of Southampton, engineer and iron founder, for his invention of certain improvements in the construction of pumps or engines for drawing water, or other fluids.—Sealed October, 10th, 6 months.

To William Woods the elder, of Newcastle-street, Farringdon-street, in the city of London, steel pen manufacturer, for his invention of a certain improvement or improvements in the construction of metal pens.—Sealed October 11th, 6 months.

To James William Durant, of Brewer-street, Somers-town, in the parish of St. Pancras, and county of Middlesex, smith, for his invention of an improved mode or modes, method or methods of securing, combining and preserving printed, written, or plain papers, prints, drawings, music, or other similar matters, so as to be readily accessible, easily referred to, and capable of being taken asunder, and replaced at any time with facility.—Sealed October 12th, 6 months.

NOVEL INVENTION.

Prosser's Patent Coffin Nails.

We have to acknowledge the receipt of a beautiful sample of coffin nails, manufactured by Mr. Richard Prosser of Birmingham, in the manner described in our Report of his Patent, page 29, Vol. VIII., Second Series of this Journal; and we have no hesitation in saying that a more perfect article cannot be desired, and the great superiority they possess over the common cast coffin nails must insure their exclusive use, and realize the most sanguine expectation of the Patentee. The heads of these nails are formed from polished plates of metal, either tinned or lacquered, and, therefore, do not require turning like the cast ones. The heads are all of the same exact size and form, with perfect edges, having none of the roughness left from casting, as in the common coffin nails. The sample of nails is left at the Office for Patents, 66, Chancery-lane, for the inspection of any person who feels an inclination to see them.

METEROLOGICAL JOURNAL,

1832.	Thermo.		Barometer.		Rain in inches.	1832.	Thermo.		Barometer.		Rain in inches.
	Hig.	Low	Hig.	Low.			Hig.	Low	Hig.	Low.	
Sept.						Oct.					
26	71	39	30,24	30,16		11	68	49	30,22	30,16	
27	70	41	30,14	30,09		12	62	52	29,98	29,68	
28	67	41	30,07	30,01		13	61	39	30,07	29,89	
29	69	40	29,99	29,92		14	61	41	30,23	30,20	
30	67	50	29,93	29,89	,1	15	63	40	30,19	30,11	
Oct.											
1	65	48	29,98	29,94		16	61	43	30,17	30,11	
2	63	50	29,89	Staty.	,4	17	57	31	30,24	30,22	
3	63	41	29,89	29,77		18	59	41	30,22	30,15	
4	61	44	29,74	29,57		19	57	43	30,20	30,14	,025
5	61	48	29,44	29,33	,525	20	58	28	30,25	30,21	
6	61	40	29,51	29,44	,55	21	57	31	30,26	30,24	
7	62	33	29,58	29,52	,5	22	57	34	30,19	Staty.	
8	61	47	29,57	29,16	,55	23	56	35	30,27	30,23	
9	59	40	59,89	29,76	,05	24	53	40	30,26	Staty.	
10	62	40	30,04	30,00	,025	25	53	37	30,33	30,31	

Edmonton. CHARLES HENRY ADAMS.

Latitude 51° 37 32 N.
Longitude 3 51 West of Greenwich.

CELESTIAL PHENOMENA, for November, 1832.

D.	H.	M.	
1	0	0	☿ passes the meridian 0 h. 21 m.
1	0	0	♀ passes the meridian 1 h. 43 m.
1	0	0	♂ passes the meridian 13 h. 42 m.
1	0	0	♃ passes the meridian 8 h. 54 m.
1	0	0	♄ passes the meridian 21 h. 13 m.
1	0	0	♅ passes the meridian, 6 h. 41 m.
1	0	0	☽ passes the meridian, 7 h. 11 m.
1	0	0	Clock after the ☉ 16m. 16 sec.
2	6	26	♃'s first satellite will immerge.
3	12	48	☽ in conj. with ♃ long. 18. in Pisces, ♃ lat. 1. 30. S. ☽ lat. 3. 54. S. diff. of lat. 2. 24.
3	0	0	☉ rises 7 h. 16 m. sets 4 h. 44 m.
3	0	0	☽ sets 0 h. 59 m.
5	0	0	☉ rises 7 h. 20 m. sets 4 h. 40 m.
5	0	0	☽ passes meridian 10 h. 11 m.
5	0	0	Clock after the ☉ 16 m. 14 s.
5	0	0	☽ sets 3 h. 18 m.
7	0	0	☽ in occultation with μ in Ceti, immersion 8h. 27m. emersion 9h. 32m.
7	0	0	☿ in Aphelio.
8	8	30	Ecliptic opposition or ○ full moon.
8	0	0	Vesta R. A. 14 h. 10 m. dec. 8. 10. S.
8	0	0	Juno R. A. 13 h. 45 m. dec. 5. 29 S.
8	0	0	Pallas R. A. 23 h. 21 m. dec. 13. 52. S.
8	0	0	Ceres R. A. 2 h. 32 m. dec 3. 50. N.
8	4	0	in conj. with κ in Libra
9	0	0	☽ rises 5 h 47 m.
9	0	30	☽ in conj. with ♂ long. 2. in Gemini ☽ lat. 4. 7. S. ♂ lat. 26. N. diff. of lat. 4. 33.
10	0	0	☉ rises 7h. 28. sets 4 h. 32 m.
10	0	0	☽ passes the meridian, 1 h. 36 m.
10	0	0	Clock after the ☉ 15 m. 53 sec.
11	15	0	☽ in Perigee.
12	0	0	☽ rises 8 h. 21 m.
13	0	0	Jupiter stationary.
15	3	52	☽ in □ or last quarter.
15	0	0	☉ rises 7 h. 36 m. sets 4 h. 24. m.
15	0	0	☽ passes the meridian 6 h. 27 m.
16	0	0	☽ rises at midnight.
16	10	17	Jupiter's first sat. will immerge
17	6	3	Jupiter's third satellite will immerge.
17	7	10	Jupiter's second sat. will im.
17	14	4	☽ in conj. with ♄ long. 5 in Virgo ☽ lat. 4. 23. N. ♄ lat. 2 2. N. diff. of lat. 2. 21
18	0	0	Clock after the ☉ 14 m. 35 sec.
19	0	0	♀ in Aphelio.
20	0	0	☉ rises 7 h. 44 m. sets 4 h. 16 m.
20	3	30	☉ in opposition to ♂
21	18	24	☉ enters Sagittarius
22	9	17	Ecliptic conj. or ● new moon.
23	8	34	☽ in conj. with ☿ long. 18. in Sagitt, ☽ lat. 2. 48. N. ☿ lat. 2 17 S. dif. of lat. 5 5
24	14	15	☽ in conj. with ♀ long 3. in Capri. ☽ lat. 1. 54 N. ♀ lat 1. 37. S. diff. of lat. 3. 31.
25	0	0	☉ rises 7 h. 50 m. sets 4 h. 10m.
25	6	42	Jupiter's first sat. will immerge.
25	0	0	☽ passes the meridian 2 h. 37 m.
26	0	0	☽ sets 7 h. 34 m.
27	12	0	☽ in Apogee.
28	0	0	Vesta R. A. 14 h. 50 m. dec. 11. 31. S.
28	0	0	Juno R. A. 14 h. 11 m. dec. 7. 11. S.
28	0	0	Pallas R. A. 23 h. 25 m. dec. 15. 0. S.
28	0	0	Ceres R. A. 2 h. 16 m. dec. 3. 56. N.
28	0	0	Clock after the ☉ 11 m. 43 s.
28	1	0	☽ in conj. with ♅ long. 15 in Aquarius. ☽ lat. 1. 40. S. ♅ lat. 41. S. diff. of lat. 2. 21.
30	0	0	☽ passes the meridian 6 h. 29 m.
30	0	0	☉ rises 7 h. 56 m. sets 4 h. 4 m.
30	0	58	☽ in □ or first quarter.
30	22	0	☽ in conj. with Jupiter, long. 19 in Pisces, ☽ lat. 4. 10. S. Jupiter, lat. 1. 23. S. diff. of lat. 5. 33.

J. LEWTHWAITE. Rotherhithe.

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PATENT INVENTIONS.

No. VIII.

(CONJOINED SERIES.)

Recent Patents.

To John Heathcoat, *of Tiverton, in the county of Devon, lace manufacturer, for his invention of certain improvements in the machinery used for the making of bobbin or twist lace net, whereby net and other fabrics may be produced.*—[Sealed October 3d, 1831.]

These improvements consist in certain mechanical appendages to be attached to a machine of the ordinary construction employed for the making of bobbin net or twist lace, the object of which is to effect the combination of various kinds of fabric heretofore produced by that description of machine known in the trade by the name of "warp frame," with the ordinary bobbin net.

"These improvements are capable of being adapted to various principles or systems of mechanism for making bobbin net. I have, however, thought it sufficient to show the mode of constructing the improved machinery, and of connecting the same to that particular kind of machine called the circular bolt principle.

In Plate XIX, fig. 1, is a front elevation of a circular bolt machine for making bobbin net lace, in which the improved parts are shown in the situations they are intended to occupy when put to work; fig. 2, is a sectional elevation taken transversely through the machine; and fig. 3, is an elevation showing that part of the back of the machine which is toward the left end of fig. 1.

For the better illustration of this invention, fig. 4, exhibits an elevation of the improved parts alone upon a larger scale, and fig. 5, is a transverse section of the same, in all which figures the similar letters refer to corresponding parts of the machinery.

Rotary motion is given to the machine by means of a band from any first mover passed over the rigger *a*, or by any other convenient means the main horizontal shaft *b*, *b*, may be actuated. Pinions on this shaft take into the toothed wheel *c*, *c*, on the tappet shaft *d*, *d*, which drive the operative parts of the lace making machine in the ordinary way, and, therefore, need no further description. On the end of the tappet shaft *d*, there is a bevel pinion *e*, taking into a corresponding bevel pinion on the vertical shaft *f*, which vertical shaft carries the cams or tappet wheels that give motion to the several mechanical appendages for producing in combination with the lace net, the various kinds of fabric commonly made by warp machinery.

The fabric to be produced, is effected by interweaving silk, cotton, or other fibrous materials with the ordinary bobbin net, by means of looped stitches passed through the meshes of the net, and round the threads which form the meshes, by the agency of guides and needles in a similar way to the operation of the warp machine.

The silk, cotton, or other material intended to be interwoven with the net, is first wound upon rollers *g*, and *h*, which are placed above the lace machine, from whence it is conducted downwards to the guides *i*, *i*, (shown in two views of half the real size, in the detached fig. 6.

These guides are mounted in leads, and screwed to the bar *k*, *k*, extending along the front of the machine, which bar *k*, is suspended upon links *l*, *l*, *l*, from the longitudinal shaft *m*, *m*, that vibrates upon its bearings. The needles *o*, *o*, to be employed in forming the loops or stitches and interweaving them with the net, are furnished with beards or spring hooks, as in the ordinary warp frame, and are mounted in leads, as shown half size at figs. 7.

The leads of these needles are attached to the bar *p*, *p*, placed at the back of the machine; which bar also is suspended by links *j*, *j*, from the shaft *q*, *q*, and to these shafts *m*, and *q*, vibrating motion is given by the rotary cams on the vertical shaft *f*, before mentioned.

In the bar *r*, commonly called the facing bar, which extends through the lace machine, just above the taking up points there is inserted a long plate, or a series of short plates *s*, *s*, *s*. This plate is perforated with a series of holes in a straight line, each hole being sufficiently large to allow one of the needles to be protruded through. The respective holes of this plate are situate exactly opposite to and corresponding with a line of meshes in the net, and the points of the needles rest in these holes previously to their being passed through the net. The guides *i*, and needles *o*, above described, are placed in the machine immediately over the taking up points, and should be as near to them as convenience will allow.

Having described the relative situation of the guides and needles, and also of the rollers which supply them with silk, cotton, or other thread, to produce the work; I now proceed to explain the operation intended to be performed, reserving the details of the mechanism, which will be best understood when the objects are known.

An advancing movement being given to the needle bar *p,* the ends of the needles *o,* are protruded about half an inch through the holes of the plates *s, s,* and through the meshes of the net *t,* which is extended over the facing bar *r,* shown detached and in section at fig. 8.

In this position the needles remain stationary while movement is given to the guide bar *k.* By this movement the end of the guides carrying the thread, are depressed and conducted round the under parts of the needles moving sideways at the same time, and then rising up to their former situation for the purpose of laying each thread in a loop round the needle, ready to be drawn within the beard or spring hook, when the guides recede. The next movement causes the guides to recede, which draws the looped thread up to the points of the needles within the beards.

Another movement at the same time causes the needles to recede, when their springs or beards are brought against the rounded horizontal edge *u,* of a pendant frame *v,* (shown detached in section, half size, at fig. 9), and by means of this horizontal edge *u,* which is called the presser bar, the beards of the needles are pressed closely into small grooves or recesses in the under parts of the needles, in order to allow of their repassing the meshes of the net, without catching whilst in the act of drawing the loops of threads which they have just received from the guides, through the meshes of the lace.

During the operation just described the various evolutions of the lace machine have been proceeding, and a portion of the net, that is a row of meshes across the machine, have been produced. The action of the points in beating up the net, and of the work roller in drawing it up has, at this period of the operation, (viz. the receding of the needles above described) presented another row of meshes opposite to the holes in the plate *s*. The needles are therefore again advanced, and in passing through the net the loops of thread which they had previously drawn through, are pressed or slidden back from under the beards of the needles on to their stems. The needles are now ready to receive another supply of thread, and to have it looped round them by a similar movement of the guides to the one above described; and if the pattern or fabric to be produced upon the lace is intended to be formed by rows of single stitches in straight lines, then the same guides are respectively to supply the same needles as before; but if a broad stripe of work of many rows of stitches connected is intended to be wrought, it will then be necessary to cause the guides to traverse laterally, and to supply the threads respectively to the next needles to those which they formerly operated upon.

On the needles receding again over the presser bar, their beards, as before, are pressed into their recesses, by which they are not only enabled to pass freely through the net, but also to let the loops of thread previously made, and last described as resting upon the stems of the needles, to slide over them; by which means the needles, in receding to the extremity of their movements, draw the new loops through those made before, and thereby secure the stitch. At this moment the work roller turns a little, draws up the first described row of loops or stitches combined with or attached to the meshes of the lace, whilst the loops last formed upon the needles are left there, under the beards, in order to have another set of loops drawn through them at the next operation.

Thus a succession of loops or stitches of silk, cotton, or other thread, are worked into or upon the meshes of the net *in stripes*, and which loops or stitches may be arranged in a variety of forms or patterns upon the lace by shifting the needles or the guides by any other means usually practised in the working of warp machines.

Having explained the general features of my invention, I now proceed to describe the several parts of the mechanism to be connected with a lace making machine, for the purpose of producing the proposed fabric.

Let it be considered that the lace machine is in operation: the horizontal shaft *d*, revolving and consequently driving the vertical shaft *f*; the lower cam upon this vertical shaft shown at *w*, (and a plain view of which is exhibited at fig. 10,) acts against a lever *x*, at the back of the machine, for the purpose of giving vibratory motion to the back horizontal shaft *q*, which is connected by links *j*, *j*, to the horizontal needle bar *p*. While the antifriction roller at the lower end of the lever *x*, runs against the circular edge of the cam wheel *w*, the needle bar *p*, will remain stationary, and the ends of the needles *o*, rest in the holes of the plate *s*; but when that part of the cam *w*, where a segment is cut away from its edge, comes round to the antifriction roller, the back spring *y*, acting powerfully against the lever *x*, will cause the lever to move inwards, and consequently the vibrating shaft *g*, connected with it to turn sufficiently to carry the bar *p*, forward, and by that means to pass the needles *o*, through the holes in the plate *s*, for the purposes described above.

The recess in the cam *w*, is such as to allow, though it continues revolving, sufficient space of time for the needles to remain stationary in their advanced situation while the guides travel round them to produce the loops of thread as above explained; and when the larger diameter or circular part of the cam *w*, again comes round and acts against the lever *x*, the needles will be drawn back into the situations first described, and, as before said, remain for a time quiescent.

I now proceed to explain the mechanical means whereby the guides are actuated, which carry the threads of silk, cotton, or other material, and form them in loops upon the needles. In describing the movements of the guides *i, i, i*, it is first to be observed that the guide bar *k*, hangs upon joints or small axles *z, z, z*, in the links *l, l, l*, pendant from the vibratory shaft *m*, and that the guides derive their movements from the upper cam wheel A, fixed upon the perpendicular shaft *f*.

As the cam wheel A, revolves, its periphery (seen in the horizontal view, fig. 11,) comes against an anti-friction roller in the end of the lever B, and consequently lifts that end of the lever, and as it turns upon a fulcrum in the middle, necessarily causes the opposite end of the lever to be depressed.

Near the said opposite end of this lever a clip C, is screwed, which with the extremity of the lever together constitute what may be called a finger and thumb; upon the guide bar *k*, towards its left end, there is affixed a perpendicular arm D, which is bent back at its upper part, and terminates in a small upright pin E; and from the side of this arm D, a small piece extends which is taken hold of by the finger and thumb of the horizontal lever B, before described.

It will now be perceived that when the elevated part of the cam wheel A, forces outwards the end of the lever B, the finger and thumb C, at the opposite end will press inwards the upper part of the arm D, and by so doing tilt up the guide bar, and cause the ends of the guides to be depressed below the needles. The pin E, at the top of the arm D, by being thus pressed inwards is made to pass between an inclined plane at the inside of the stationary piece G, and a spring steed H, commonly called by the trade a "castaback." This steed H, is formed like the frustrum of a cone, and is affixed to a small lever I, which has a spring J, acting behind it. The pin of the arm D, therefore, when forced back against the inclined plane I, escapes through the castaback behind the spring stud J, and in so doing is slidden with the guide bar *k*, and also the guides *i*, to the left, which movement of the guides *i*, carries the threads under the needles, as before described.

The roller at the end of the lever B, now drops off the elevation of the cam as it revolves, on to the circular part of the wheel. This enables the lever B, to resume its former situation, and consequently the arm D, to rise to its perpendicular, and the guide bar *k*, to its level position, where it is slidden back again to the right upon its axles by the force of springs K, so as to occupy its former place. By these movements, the guides have been made to carry the threads under and round the needles, and to lay them upon the needles in loops, as before explained.

In order to make the guides recede, and draw the loops of thread under the beards up to the points of the needles as before described, a small cam L, (see fig. 11), fixed on the upper surface of the wheel A, now acts against the end of a pendant lever M, and being by means of the cam forced outwards, gives movement to the shaft *m*, and consequently, through the links *l, l, l*, to the bar *k*, which draws back the guides for the purpose of tightening the threads, and when the cam L, has passed the lever, the force of a spring N, causes the guide bar *k*, to move inwards again to its quiescent position.

In order to supply the guides with threads for the operation above described, the silk, cotton, or other materials wound upon the rollers *g*, and *h*, as before said, is passed from the rollers to the guides, as a warp, between reeds or by any other convenient mode of dividing the threads as shown in front of the machine at P, P. The necessary quantity of thread is given off by a small rotary movement which the roller *h*, receives from a click R, attached to the back vibrating shaft *q*, which click takes into the teeth of a ratchet wheel *s*, affixed to the axle of the roller *h*, and drives it a few teeth at every vibration of the shaft *q*, for the purpose of delivering that portion of the thread which is to constitute the internal part of the stripe work. The other roller *g*, which is driven at the reverse end by the wheels T, communicating with a wheel on the axle of the roller *h*, furnishes the threads for the selvages of the stripe, and when stripes or lines of single stitches are intended to be worked upon the lace, one only of these rollers will be required.

It is only necessary further for me to describe the means by which broad patterns or stripes of the fabric, consisting of several lines of stitches connected together, may be wrought upon the lace net. This I effect by means of a shogging or lateral movement given to the guides, or to the needles; if to the latter, the plates with holes through which the needles pass, must be shogged also, and for this purpose I find it convenient to employ a cam wheel V, driven by a pinion at the top of the perpendicular shaft *f*, the periphery of which cam wheel must be cut into such suitable elevations and indentations as will effect the object by acting against an antifriction roller in the standard U, fixed to the front vibrating shaft *m*, and by that means shogging or shifting that shaft, and consequently the guide bar, which is an operation well understood by lace makers;

but I do not intend to confine myself to this particular mode of shogging or traversing the guides or needles for the purpose of producing varieties of work, as several other modes might be employed which would be equally effective.

Lastly, I wish it to be understood that though I have described my improved machinery in connexion with a lace machine, constructed upon the circular bolt principle and actuated by rotary power, yet I do not intend to limit myself in its adaptation to that particular principle of machinery alone; as it is obvious that the contrivance may be applied, with such modifications as each case shall require, to other constructions or principles of machinery for making bobbin net lace, and whether driven by rotary power or by the hands of the workman; but I claim as my invention the adaptation of needles and guides, as employed in the warp machine, to work in connexion with a machine for making bobbin net, whereby those varieties of work produced by warp machines, may be made or wrought in or upon the fabric of the net, produced in the bobbin net machine. [*Inrolled in the Rolls Chapel Office* April 1832.]

Specification drawn by Messrs. Newton and Berry.

To GEORGE LOWE, *of the Gas Works, Brick Lane, in the parish of St. Luke's, in the county of Middlesex, civil engineer, for his invention of an improvement or improvements in, and connected with, the manufacture of gas for illumination.*—[Sealed 12th October, 1832.]

THIS invention is described as consisting "firstly, in the introduction of atmospheric air raised to a high degree of temperature over or on the surface of the fuel in the furnaces of gas works, for the purpose of uniting with, and thus igniting the sulphuretted hydrogen gas, and also the gases and vapours arising from lime, dreg water, and ammoniacal liquor introduced under the bars of the furnace, and the products or results of the ignition, of which gases and vapours direct into condensers so as to produce sulphurous acid, which acid I use in purifying gas as hereinafter described in the third part of my said invention.

Secondly, in an improved mode of working off the charge from gas retorts by fitting them with some appropriate apparatus, such as hereinafter described, for that purpose, and by putting the coal in at each end, alternately half of the length of the retort, and at proper intervals, so that the inferior gas evolving from the portion of coal first introduced may mix with the better gas evolving from that portion subsequently introduced, thus making gas of a better general average quality in greater quantity than by those modes now in use.

Thirdly, in an improved mode of rendering gas produced from coal, for the purposes of illuminating, more free from ammonia, and its combinations with sulphuretted hydrogen and other impurities than heretofore, by the application of sulphurous acid in solution or combination with steam, by the application of muriatic acid in solution or combination with steam, or by the exhibition of potash in the retorts.

And fourthly and lastly, in the application of a new apparatus to retorts, coke ovens or furnaces of gas works, for the purpose of receiving the hot coke drawn therefrom, and generating gas by means thereof.

And, in further compliance with the said proviso, I, the said George Lowe, do hereby describe the manner in which my said invention is to be performed by the following description thereof, reference being had to the drawing annexed, and to the figures and letters marked thereon, (that is to say,) firstly, as to the introduction of atmospheric air raised to a high degree of temperature over or on the surface of the fuel contained in the furnaces of gas works, and the manufacture of sulphurous acid as hereinafter explained.

Plate XX, fig. 1, is a longitudinal section, and fig. 2, a transverse section, of a furnace containing three retorts. Fig. 1, showing also the hydraulic mains, with the dip and bridge pipes, which connect them with the retorts, and which will be more particularly explained under the second head of my said invention.

It may be as well here to observe, that similar letters of reference are used to denote similar parts in both figs. 1, and 2. The parts marked *a,* are the retorts, those marked *b,* the dip pipes; those marked *c,* the stand or perpendicular pipes; *j, j,* the hydraulic mains; *d, d, d,* the furnace; *e, e, e,* the grate bars; *f, f, f,* the ash pit; *g, g, g,* pans containing lime, dreg water, or ammoniacal liquor as now in common use, in addition to which pans a pipe will of course be added, when sulphuretted hydrogen gas is to be introduced under the bars, as heretofore practised; *h, h, h, h,* the first or entrance air flue, and which air flue extends to near the centre of the furnace, where, by a perpendicular opening, it communicates to the upper air flues *k, k, k, k,* of the same capacity as the first, and which air flue finally communicates with the furnace by the openings marked *l,* in fig. 1.

This flue *k,* at its opening to the external atmosphere, must be stopped close when at work, the only object of this opening being to clean it out when requisite. From the above description it is plain, that when the furnace is heated to the proper degree of temperature for decomposing the coal in the retorts, the atmospheric air admitted at the first openings *h, h,* will, when it reaches the upper air flue *k, k,* be greatly heated before it is introduced into the furnace by the openings *l, l.* The quantity of air admitted into the air flues, can be regulated by registers or regulators fixed at the entrance air flues *h, h,* and in all cases the entrance air flues *h, h,* must be of such a length, and so far exposed to the heat of the furnace, that it shall, before entering the furnace at the openings *l, l,* be raised to a high degree of temperature, say about equal to 700° of Fahrenheit, but the hotter it is the better.

This arrangement of flues will be found to effect the ignition hereinbefore mentioned as one object of this part of my said invention, and the following arrangement of apparatus described in fig. 4, will show the mode of making sulphurous acid at the same time. In fig. 4, *a,* and *b,* is a flue supposed to lead at the end *a,* from the retort furnace, shown in fig 2, to a chimney at the end; *b, c,* is a stop valve in the flue to check and divert the current of the vapours or products of combustion passing from the furnace into and through the condenser *d, g, f, e*; *h, h,* are two stop cocks to draw off the sulphurous acid, which, under this arrangement, will be deposited from the vapours or products of combustion in the condensor, and which sulphurous acid will thus run into the receivers *j, j*; *k,* is a small pipe for the admission of steam into the condenser at *d,* which will assist in the condensation of the sulphurous acid.

Secondly, as regards my improved mode of working off the charge, I make use of retorts, about twice as long as those commonly used in coal gas works; and, I prefer them made of wrought iron, about half-an-inch in thickness, and that the transverse sections of the retorts should represent the forms shown in the drawing fig. 2, *a*, *a*, *a*. The retorts are open at each end, and have a mouth piece attached to each, by the usual means. These mouth pieces are each filled up with stand pipes, to which are fitted, as usual, bridge pipes, dip pipes, and hydraulic mains, care being taken only that one of the dip pipes *b* 1, does not seal or dip into the tar or liquid of the hydraulic main, so far as does the dip pipe *b* 2; and this shorter dip pipe is furnished with a cup valve or stop cock, *m*, capable of so closing this dip pipe, by means of the lever *n*, as to force the gas, when required to escape, out at the dip pipe *b* 2. Any number of retorts found most convenient may be set up in one oven or furnace to constitute a setting of retorts, but I prefer three, as shown in the drawing accompanying these presents.

I will now describe the mode of operating with retorts so arranged as aforesaid. Instead of putting the whole charge of coals in at one time, and taking off the gas at one end, or mouth piece only of the retort, my plan is as follows:—

Supposing the retort 1 *a*, *a* 2, to be empty, I charge only one half of its length or thereabouts, say from 1 *a*, to *a*, and leave the valve *m*, down or open, as shown in the figure, in order that the gas may pass out at *b* 1, and receive the additional heat of the remaining or empty part of the retort. It will be seen that the gas must necessarily take the course, because the seal B 1, is not so deep as the seal B 2. When in this position, (supposing the charge to be an eight hour charge,) then, at the expiration of four hours, end *a* 2, of the retort should be opened, and the empty half of the retort from *a* 2, to *a*, should be charged with coal, and closed as usual. The lever *n*, should then be acted upon so as to draw up the cup valve *m*, close to the mouth of the dip pipe *b* 1, which cup being deeper than the seal at *b* 2, will stop the gas from continuing its course out at *b* 1, and oblige it to pass out at *b* 2, thus compelling the gas evolved from the fresh portion of coal, to traverse over and through that portion which was first put into the retort, whereby a combination is effected between the gas arising from each portion. At the expiration of eight hours from the commencement of the operation, the lid 1 *a*, of the retort is taken off, and that part of the charge between 1 *a*, and *a*, which we must imagine to be now nearly exhausted of its gas, is to be drawn or cleared out, and a fresh charge of coal put in, and the lid replaced. At the same time, the cup or valve attached to the dip pipe *b* 1, which was before lifted up or closed, must now be lowered or opened into its original position, in order to make the gas escape at *b* 1, thus causing the gas from the fresh charge of coals to traverse between *a*, and *a* 2, in like manner as it formerly traversed between *a*, and 1 *a*, and with the like effects. These alternate operations are continued every four hours; and, therefore, I call my retort so arranged, a reciprocating retort.

By this routine the gas and vapours of the earlier hours of the charge will combine and mix with those producing from the latter hours, whereby much more and better gas is produced than by any process now adopted, whilst the quantity of coal, tar, and ammoniacal liquor usually formed are both much reduced.

If it should be desirable to make gas from coal tar with these retorts, I introduce an iron pan containing tar into the mouth piece of each retort, at the time of its charging with coal; and it is only necessary farther to observe that if the charge be a six hour charge, the alternations will be every three hours, and so on in proportion to the duration of the charge.

Thirdly, as regards my improved mode of rendering gas produced from coal more free from ammonia and its combinations with sulphuretted hydrogen, and other impurities than heretofore, I cause a pipe from a steam boiler to deliver its steam below the surface of either sulphurous or muriatic acid, contained in any suitable covered vessel, partly filled only, and connected by a pipe from its top to that part of the gas apparatus called the condenser refrigerator. When this vessel and its contents shall have attained a boiling temperature, the steam will then pass on, carrying with it in solution the vapours of the acid, and this mixture of steam and acid I introduce into the coal gas as it leaves the condenser. The quantity of acid and steam to be introduced into the coal gas, will wholly depend upon the quality or nature of the coal, from which the gas is obtained; it is therefore impossible to state any exact quantity of acid that may be in each case requisite, the object in all cases being to perfectly neutralize the ammonia by the acid; and the best indication whether enough or too much has been introduced is from the effect the gas has upon the usual chemical tests, applied for indicating the presence of acids or of ammonia. In order to insure plenty of steam, and at the same time avoid waste of acid by admitting much steam, the proper quantity to be introduced to the acid vessels may be regulated by a valve or stop cock. The proportion of steam required should not be much less than what will produce, when again condensed, about one imperial gallon for 1,000 cubic feet of gas which has been submitted to the foregoing process. I also cause a plate of sheet iron, covered about half an inch deep with potash, to be placed on the surface of the coal in the retort, at the time of charging, and left there till the charge be withdrawn, which will be found still further to purify the gas.

Fourthly, as to the new apparatus hereinbefore mentioned to be applied to the retorts, coke ovens, or furnaces of gas works, it is as follows; reference being had to fig. 3, in the drawing annexed, *a*, is a cylinder of wrought or cast iron, and must be made of such dimensions that when lined internally from top to bottom, with fire bricks, it shall be fully able to contain the charge or quantity of coke about to be drawn from the retorts, coke ovens, or furnaces adjacent to which such cylinder is placed; *b*, is a grating or set of fire bars near the bottom of the cylinder, for the purpose of increasing or keeping up the heat of the coke as hereinafter described; *c*, is a lid or cover fastened up against the bottom of the cylinder in the ordinary mode of fastening the lids of retorts to prevent the access of air to the grate or fire bars when necessary; *d*, is a similar lid at the upper part of the cylinder; *e*, is an induction pipe for whatever matter may be introduced for the purpose of generating gas; and *f*, is an eduction or exit pipe for the said gas to pass out to a condenser or other apparatus. This pipe *f*, it will be seen by the dotted lines, may be a three branch pipe, the utility of which will be described hereafter; *g*, is a hopper or feeder, supposed in this figure to be placed under the floor of the retort house, and in front of a branch of retorts so as to receive the coke when drawn from the retorts, and conduct it into the cylinder *a*, but this hopper *g*, forms no part of my new apparatus.

Having now described the said new apparatus, I will proceed to explain the manner of using the same; having removed the lids *c*, and *d*, I fill the cylinder *a*, with hot coke from the retorts through the hopper *g*, the lid *c*, being off, the atmospheric air will rush up the cylinder, and greatly increase the temperature of the coke, and the nearer this heat approaches a white heat, the better. When the greatest possible heat is obtained by this means, or when the upper portion of coke has attained a bright red heat, close both the lids *c*, and *d*, and turn on the steam or other matter to be introduced through the pipe *e*. This will of course cause gas to be generated, which will be passed off at the pipe *f*.

If the gas made in this manner be produced from steam, it is evident that it will not pass off from the cylinder *a*, in a state fit for illumination, but must be subsequently submitted to the known process of saturation with the vapour of essential oil or other similar illuminating matter, in order to render it fit for use.

The advantage of making the pipe *f*, a three branch pipe, would be to prevent an useless expenditure of heat by opening the upper branch first, and when gas ceases to be produced from the upper portion of the coke, then by opening the next branch below, and so on to the lowest branch, stopping the upper ones, as those below are opened.

Now whereas, as regards the first part of my said invention, I do not claim the introduction of heated air over or on the surface of the fuel of the furnaces generally, but only its application to furnaces of gas works, where lime or dreg water, ammoniacal liquor, or sulphuretted hydrogen gas, are evaporated or introduced under their bars, and also its application for the purpose of uniting the said heated air with, and thus igniting the sulphuretted hydrogen gas, and the gases and vapours arising from the said lime dreg water, and ammoniacal liquor, whereby I prevent the escape of a large portion of sulphuretted hydrogen gas, which otherwise passes up the chimney into the atmosphere, to the annoyance of the neighbourhood. And further, I claim the manufacture at the same time by this means, of the sulphuric acid required for carrying into effect the third part of my said invention. And whereas, as regards the second part of my said invention, I do not claim the particular mode hereinbefore specified, of causing the reciprocating action of the gas by dip pipes and hydraulic mains and valves, because the same effect may be obtained by other means or apparatus; but whereas, I claim as my invention, the mode of charging the retorts, hereinbefore described, and causing a mixture and combination of the gases evolving from alternate charges in the same retort, by the application of an exit gas pipe at each end of the retort, and also causing the gas to pass off alternately at each pipe by some such appropriate apparatus as that described at fig. 1.

And whereas, as regards the third part of my said invention, I claim the combination of steam with sulphurous acid, or steam with muriatic acid applied to coal gas, and the introduction of potash in the retorts as hereinbefore described, for the purpose aforesaid. And whereas, as regards the fourth part of my said invention, I claim the apparatus hereinbefore described at fig. 3, for the purpose hereinbefore mentioned; and such is my invention, described as consisting of four parts, being to the best of my knowledge and belief entirely new, and never before used in that part of his said Majesty's United Kingdom of Great Britain called England, his Dominion of Wales, the Town of Berwick upon Tweed; I do hereby declare this to be my specification of my said invention, and that I do verily believe, this my said specification doth comply in all respects fully, and without disguise, with the proviso in the said hereinbefore, in part recited Letters Patent contained; wherefore, I do hereby claim to maintain exclusive right and privilege to my said invention.—[*Inrolled in the Inrolment Office, April,* 1832.]

Specification drawn by the Patentee.

To John Dickinson, *of Nash Mills, in the parish of Abbots Langley, in the county of Herts, Esq. for his having invented or found out an improved method of manufacturing paper by means of machinery.*— [Sealed 6th October, 1830.]

This improvement consists in a method of uniting two sheets of paper pulp by means of machinery, in order to produce paper of extraordinary thickness. Combining two or more thicknesses or sheets of pulp by a process called couching is not new, having been long employed, particularly in making stout drawing papers and fine Bristol boards; but the present is a mode of doing the same in a paper making machine, which has been done heretofore by hand.

Plate XX, fig. 5, is to be considered only as a diagram illustrating the mode of operating, as the Patentee says that the machinery may be arranged in various ways to suit the convenience of the premises in which it is to be employed.

Two vats as *a, a,* are to be supplied with paper stuff in the ordinary way; *b,* and *c,* are hollow barrels or drums made to revolve in the vats, upon axles driven by any first mover; which perhaps may be most conveniently done by riggers and bands from a water mill, or a steam engine. Drums, like those proposed to be employed, the Patentee says are his own invention, and have been used by him for several years, for the purpose of taking up a coating of the paper pulp upon their peripheries as moulds, and depositing the sheets of paper so formed upon endless felts, to be carried off to the pressing and drying cylinders; it is therefore the combination of two sets of these drums, and their appendages, which constitutes the subject of this invention, and by which two sheets or thicknesses of pulp may be formed, and afterwards united together by the following means:—

An endless felt *d, d, d, d,* is conducted by guide rollers, and brought into contact with the drums *b,* and *c*; the drum *b,* first gives off the sheet of paper pulp from its periphery on to the felt *d,* and passing over the pressing roller *e,* is conducted by the felt in the direction of the arrow to that part of the drum *c,* which is in contact with the pressing roller *f.* A similar sheet of paper pulp is now given off from the drum *c,* and which is brought in contact with the former by the pressure of the roller *f.* The two sheets of paper pulp thus united, are carried forward by the felt *d,* over a guide roller *g,* and onward to a pair of pressing rollers, where the contact of the moist surfaces of the pulp are made to adhere and to constitute one thick sheet of paper, which afterwards passing over the surfaces of hollow rollers or drums heated by steam, becomes dried and firm in its texture.

It is obvious that the rotary movements of the two drums *b,* and *c,* must be simultaneous, in order to keep both sheets of paper smooth, but that of the pressing rollers by which the sheets are ultimately made to adhere, should be a little faster: because the sheets expand by the pressure, and it is absolutely necessary that they should be drawn forward as fast as delivered.

The other manipulations of the machinery it is not necessary to describe, as they are known, and in ordinary use, the invention claimed being as before said, simply, the mode of bringing the two sheets into connection.—[*Inrolled in the Inrolment Office, April,* 1831.]

To John Dickinson, *of Nash Mills, in the parish of Abbots Langley, in the county of Hertford, Esq, for his having invented or found out certain improvements in the manufacture of paper.*—[Sealed 10th Jan. 1832.]

Since the introduction of a strainer for separating the knots and lumps from the fine fibres of the pulp, in making paper, invented by Mr. Ibotson (see the 7th vol. of London Journal, Second Series), the great superiority in the quality of the paper produced by this improvement has induced several other persons to suggest modes of effecting the same object by various means (see Turner's Patent, vol. 8th, Second Series, and Brewer's Patent, in the present vol. p. 337.) This invention aims at the same object, and is thus described by the Patentee—

The first of my improvements in the manufacture of paper consists in a process of purifying the pulp from knots, grit and other impurities, by causing it, in a diluted fluid state, to pass between longitudinal apertures on the surface of a revolving cylinder, about the hundred and fifteenth part of an inch wide. The apparatus for this purpose is shown in the figures (see Plate XX.)

Fig. 6, exhibits a longitudinal section; fig. 7, a transverse section, and fig. 8, a plan; and in all the three figures the same letters are used for reference to the several parts. Letter *a*, represents a shallow vat, in which the revolving cylinder *b*, works. The pulp being diluted to that consistency which suits the paper machine it is intended to supply, is delivered into this vat, and the level of it is regulated by means of a waste, so as to keep the vat nearly full. From this vat there is no other outlet for the pulp except through the periphery of the revolving cylinder *b*, and out of each end of it into the troughs *c, c,* through which it is conducted to the machine that is intended to make it into paper.

The revolving cylinder *b*, is constructed like a squirrel cage, of circular hoops, or an endless spiral wire attached to transverse metal bars *x*, *x*, and is so formed that the spaces between the hoops, or between each spiral ring of the wire, are sufficient to allow of the passage of the fibres of pulp, but narrow enough to intercept the knots and other substances, which it is desirable to keep out of the paper, and which, when the machine is at work, will therefore remain and accumulate in the vat *a*.

For making fine papers it is found practicable to pass the pulp through spaces the hundred and fifteenth part of an inch wide, and even less than that; but the cylinder must in other cases be formed with wider apertures, as for coarser paper the fibres are larger, and in some cases they require to be twice the width above specified.

It has been before mentioned, that the pulp enters the revolving cylinder solely through the periphery, the ends being solid except the axis, which at each end consists of a large tube, through which the pulp flows out. The hoops of wire, of which the periphery is formed, are about three-eighths of an inch wide on the outer surface, and about one-fourth of an inch thick; and the inner surface about one-fourth of an inch wide, so that the apertures towards the inside of the cylinder are wider than they appear externally.

The best mode of forming these cylinders is, by a spiral wire drawn to the shape above described, and wound round and attached to the transverse bars by a rivet at every point of contact, and the ends of the transverse bars require to be firmly fixed to the cylinder ends by screws and soldering.

The pulp would naturally accumulate on the surface of this cylinder, and almost immediately stop up the apertures between the wires, but this effect is prevented by the agitation of the pulp in the interior of the cylinder, produced by the constant up and down motion of the float *d.*

This instrument is of the shape described in the section, fig. 6, and is nearly long enough to reach from one end to the other of the cylinder inside. It is hollow, but made water tight, and formed of strong copper, and has a metal bar through it with an arm projecting from each end to which is fixed a strong link, and by these links it is hung to two levers *k, k,* in such a way, that the levers in moving up and down, raise and depress the float, but in all cases without bringing any part of it into contact with the cylinder.

I call this a float, but it is intended with the links and levers to which it is fixed, to be much heavier than water, so that after being elevated by the levers, it may sink very suddenly by its own weight when they are no longer supported.

The range of up and down movement given to this float, should be about one and one quarter inch, and the rate of movement about eighty or one hundred alterations per minute, and this by suddenly checking the flow of pulp through the apertures in its descent, or rather reversing the flow, which in its ascent it promotes, prevents any lodgment of the fibres of rag.

The cylinder *b,* has a toothed wheel *y,* fixed on the tube part of one of the ends, and working between two metal flanches fixed to the wooden side of the vat, for the purpose of keeping the pulp away from the wheel, and it is made to revolve by a pinion *f,* fixed on the spindle *g,* which goes across the vat, and is fixed by two plummer blocks on the outside of the troughs, and has a rotary motion given to it by the rigger *h,* by means of a strap from any convenient power at the rate of forty or fifty revolutions per minute. This spindle has also fixed upon it, two double excentrics *i, i,* immediately under the levers *k, k,* so that in every revolution it twice lifts those levers, and at the same time elevates the float *d.*

The diameter of the cylinder *b,* is not very material; I have found fourteen inches the most convenient size; the length of this cylinder must be regulated according to the size of the machine it is intended to supply with pulp, but I have found a cylinder four feet long in the grooved part sufficient to supply to a machine of the largest size in ordinary use, viz. capable of making paper four feet six inches wide, and when of that breadth it is necessary to have a wheel and pinion at each end.

The metal flanches *v, v, v,* are firmly fixed to the sides of the vat *a,* with a water tight joint, and form the bearings in which the cylinder works.

The second of my improvements relates to the transverse cutting of paper. In the machinery in use for this purpose, one knife *x, x,* fig. 9, is fixed, and the paper being drawn or led over it, after the length of a sheet has passed, another knife *z, z,* having the edge at an angle with the fixed knife is made to pass it, the one edge coming into close contact with the other, and thus the cut is performed in the manner of shears.

My improvement consists in forming the moveable knife with the cutting edge of the shape shown at *z,* in fig. 9, that is to say, the cut is intended to commence at both ends at the same time, and to be completed as soon as the middle part of the upper knife has passed the middle part of the lower one. The angle of the edges shown in the figure is what I find in practice to be sufficient for cutting, but the exact angles of the edges is not of importance.—[*Inrolled in the Inrolment Office, July,* 1832.

To JAMES PERRY, *of Red Lion Square, in the county of Middlesex, bookseller and publisher, for his having invented an improvement or improvements in or on pens.*—[Sealed 28th January, 1832.]

THE nature of my said invention, consists in a new arrangement of cuts and open spaces, formed so near to the slit of the pen, and in such directions as regards the said slit, as to cause a greater flexibility in the nibs of metallic pens than has heretofore been obtained by like means.

It will be desirable to define the following terms, which I constantly use, and which I intend should always have the same meaning throughout this Specification:—1st, the central part of the pen, is that part of it which is represented in fig. 10, see Plate XX, by the line marked at its extremities with *a*, and *b*. 2dly, The straight slit is pointed out by the letter *i*. 3dly, The shoulders of the pen are pointed by *l*, and *m*. 4thly, A stop hole is any hole communicating with the upper end of the straight slit, as shown at *k*. 5thly, An open space is any hole formed at one side of the central part of the pen, having a slit cut or opening made into it from the side of the pen, above, at, or below its shoulder, as shown at the parts marked *s*, in figs. 13 and 14.

In the several figures from 10 to 16, my improved cuts are shown by the lines *d*, *e*, and *f*, *g*, found in each of the figures. In figs. 10, 11, 13, and 15, the cuts open out below the shoulders, at the points *d*, and *f*, marked at the lower extremity of each cut, and are formed in an ascending direction towards the end of the pen marked *b*. In fig. 11, there are additional cuts opening out below the shoulders at *h*, and *i*, respectively, and joining the cuts *d*, *e*, and *f*, *g*, so that each nib in fig. 11, may be considered as having two cuts united, of which the smaller falls into the larger.

In fig. 12, the cuts open out above the shoulders, at the points *e*, and *g*, that is, at the upper extremity of each cut, and descend towards the end of the nibs, marked *a*, in a slanting direction towards the straight slit. In figs. 10, 11, 15, and 16, are stop holes pointed out in each by the letter *k*. In fig. 12, my improved open spaces are represented at *d*, and *f*, commencing in the pen above its shoulders, and continuing towards the nib *a*, in a slanting direction towards the straight slit. Figs. 13, and 14, represent my improved cuts and open spaces combined, they are represented at *d*, and *f*. In each of these two figures, the part which is a cut appears at *d*, and *f*, respectively, and in each instance, unites itself to the part which constitutes the open space; the cuts in fig. 15, are formed below the shoulders, and those of fig. 16, above the shoulders; and the open spaces in these figures extend above and below the shoulders.

I shall conclude, by observing that I give the preference to those varieties of my invention, represented by figs. 10 and 11; that I consider the best elastic steel, which is of convenient thickness, the most suitable material to be employed; that if steel is used, the pens must be brought to a spring temper, and that whatever hard and elastic metal is employed, the pens should be of about the same diameter as those from quills.

Lastly, I claim as my invention; first,—the particular arrangement and form of cuts shown in the figures; and secondly,—the particular combination and form of open spaces and cuts, shown in the figures; and lastly, all such cuts and open spaces formed at the sides of the central part of the pen, and opening out of the side of the said central part above, at, or below its shoulders, and either wholly, or in part in a direction inclining from the sides of the pen, towards the said central part, as are exhibited in the figures, and sufficiently near to the said central part, to obtain the flexibility, which will be found in the pens represented.—*Inrolled in the Inrolment Office, July,* 1832.]

To ANDREW URE, *of Southampton Row, in the county of Middlesex, doctor of medicine, for his having invented an air stove apparatus for the exhalation and condensation of vapours.*—[Sealed 20th October, 1830.]

THE apparatus herein described is designed to dry goods of different descriptions; it is said to be particularly applicable to drying sugar.

The contrivance is a box or chamber in which the goods to be dried are deposited, and beneath, contiguous to which is another box heated by steam, hot air, or any other means. An opening is left near the bottom of the drying chamber for the admission of atmospheric air, and at the opposite part of the chamber, near its top, a tube is placed for the discharge of the vapour given off in drying. To the end of this vapour tube an exhausting apparatus is to be connected, for the purpose of assisting the current of air, by drawing off the vapour, and which exhausting apparatus is intended to act as a force pump, in driving or forcing the vapour thus drawn off into a vessel of water to be then condensed.

Plate XX, fig. 17, shows the proposed drying chambers *a, a,* the bottom of which is the top of the heating vessel *b, b.* It is proposed to occupy this vessel *b,* with a steam pipe bent in suitable directions, so as to present an extended heating surface, which heat acting against the bottom of the chamber *a*, passes through the bottom into that chamber, and raises its temperature.

The goods to be dried having been introduced into the chamber at the door or opening *c*, (shown by dots,) that door is to be left partially open for the admission of atmospheric air; and the air pump, or other exhausting apparatus for drawing off the vapour, is to be connected to the pipe *d*.

Steam, which is proposed as the best means of communicating heat, is admitted into the lower box by the pipe *e*, and after circulating through the contortions of the pipe is discharged at the pipe *f*, observing that from *e*, to *f*, the pipe should slightly descend below a horizontal line, in order to discharge the condensed water which may form within.

A flap or lid is made to the box *b*, at *g*, for the purpose of gaining access to the interior, and at this part a regulator is to be adapted to the valve of the discharge pipe, by which any required degree of temperature may be preserved.

The means by which this object is proposed to be effected is by the use of an instrument called a *thermostat*, invented by the Patentee, and described in the Specification of his Patent of 20th October, 1830, for "an apparatus for regulating temperatures in vaporization, distillation, and other processes," (see London Journal of Arts, Vol. VIII, page 307, Second Series.) This thermostat is to be placed in the box *b*, under the flap *g*, and being connected to the discharge valve of the steam pipe, will, as the temperature of the box varies, open or close the steam valve, and hence keep the chamber at a uniform heat.—[*Inrolled in the Inrolment Office, April,* 1831.]

To FRANCOIS CONSTANT JACQUEMART, *of Leicester-square, in the county of Middlesex, Esq. in consequence of a communication made to him by a foreigner residing abroad, for an invention of improvements in tanning certain desctiprions of skins.*—[Sealed 20th October, 1832.]

THE Patentee states, that the skins of hares, rabbits, and sea rats, after having the down removed from them (which is used in making the inferior quality of hats) has hitherto been considered too thin to be converted into leather, and consequently has been rejected as useless, except for making glue. It is therefore proposed by a new mode of treatment, both in preparing and tanning, to render these several kinds of skins available to the purposes of making boots, shoes, gloves, and other articles, and it is for this particular method of treating those skins that the present Patent is taken.

The description given of the improved process is exceedingly confused, but which, as far as we can make it out, is as follows. After pulling out the long hairs, the skins are to be rubbed with *mercurial aquafortis*, and dried in a temperature of from 45° to 50° Reaumur's thermometer, then steeped in salt and water, and afterwards in water and blood, in order to give them substance, and to kill the salt, and then in water saturated with *dead lime.* Having been thus prepared, the fleshy parts are to be removed, the hairs taken off, and the skins placed in tan pits, with a solution of sulphuric acid, and treated much as leather is usually treated in tanning, and then prepared, by currying, and so forth, according to the kind of leather intended to be produced.

When the skins are to be preserved with the fur upon them, they are first steeped in a solution of alum, and then of lime water, and afterwards dressed as usual, which preparation, it is stated, will prevent the future destruction of the skins by moths.—[*Inrolled in the Inrolment Office, April,* 1831.]

To Samuel Clerk, *of South Down, Brixham, in the county of Devon, for his having invented certain improvements in making or preparing saddle-linings, saddle-cloths, and girths, for keeping saddles in place on horses, and other animals of burthen.*—[Sealed 20th October, 1832.

In order to prevent a saddle from slipping when attached to the back of a horse, it is proposed by the Patentee to line the under part of the saddle, with a peculiar kind of cloth or webbing, to be made with ribs or cords standing out, which shall, when pressed upon the back of the horse, embed themselves in the hairy coat of the animal, and thereby hold the saddle firmly.

This cloth or webbing is to be woven in an ordinary loom, and in place of some of the warp threads, a series of hard twisted cords about the size of goose quills, are to be introduced, at about half an inch apart (spaces in the reed being broken away to receive them), and when connected to the healds of the loom, as the other parts of the warp, they are to be woven together with the weft in the usual way, and so form a cloth or web, with ribs, cords, or ridges standing out.

This rib'd cloth, or web, is to be attached to the under part of the saddle, by the ordinary means of stitching linings; and it may also be employed for saddle cloths and girths.—[*Inrolled in the Inrolment Office, April,* 1831.]

To Richard Burgess, *of Northwick, in the county of Chester, doctor of medicine, for his having invented a drink for the cure, prevention, or relief of gout, gravel, and other diseases, which may be applied to other purposes.*—[Sealed 21st February, 1831.]

It has always been our opinion, that Patents for medicine in this country, where the Specification is exposed to public examination, never can be productive of remuneration to the inventor—for, if the recipe set forth, is really efficacious when administered to the disease for which it is prescribed, every physician would avail himself of the knowledge thus afforded, and secretly administer the same medicine with impunity. It is this circumstance which has induced the French Government to seal up all Specifications for chemical preparations, until the Patent has expired, and then to publish them for the benefit of the world at large.

If our opinion be correct in its general application, with what truth it applies to the subject now before us, our readers will immediately see, when we state that the Patentee's discovery does not consist in any particular combination of drugs or chemicals, nor in any precise discipline or regimen, but simply in the fact, that water, pure water, taken into the stomach, will cure those complaints which have baffled the art of medicine for numberless ages.

The Patentee says, that his invention consists in using distilled water as a drink for the prevention and cure of gout and gravel; and he argues that as the water by distillation will be freed from any earthy or mineral matters which it might before have held in solution, and also that the animalculi which it contained will be destroyed, the water will not only be prevented from depositing any injurious substances on the coats of the stomach, but also that it will by its purity be induced to take up those which may be formed there.

Temperance is certainly the best preventive against disease, and water in its purest state the most wholesome beverage, but is it not rather hypothetical reasoning to assume that the impurities of the liquids which we swallow are the sources of those diseases which we suffer? Is it not more probable that the solids which we take by chemical changes in that wonderful laboratory, the stomach, are made to generate, and to deposit those matters, which frequently form the embryo or nucleus of future disorders in the system?—[*Inrolled in the Inrolment Office, April,* 1831.]

To ANDREW URE, *of Burton Crescent, in the county of Middlesex, doctor of medicine, for his having invented an improvement or improvements in curing or cleansing raw or coarse sugar.*—[Sealed 20th October 1830.]

COARSE brown sugars are proposed to be treated with alcohol faintly acidulated, for the purpose, it is said, of taking up the quick lime and glutin.

Alcohol at forty per cent. overproof is to be used, and to one gallon of it add one ounce of acid, muriatic, sulphuric, or nitric; it is to be sprinkled over the sugar after it has been ganulated in the cooler. The quantity is recommended to be about one gallon of the alcohol to two or three hundred weight of sugar.

The alcohol being allowed to drain through the sugar, may be collected below incorporated with the sweets, and which should be afterwards mixed with water, and its acid neutralized by chalk, it may then be taken to the still, and distilled into rum. The sugar is to be dried under a temperature of from 120° to 160° Farenheit, and its crystals will have become so hard as not to be subject to imbibe moisture from the air in any climate. Casks will therefore be unnecessary for its transportation, as it may be packed in bags without any danger of injury.—[*Inrolled in the Inrolment Office April,* 1831.]

To AUGUSTUS APPLEGARTH, *of Crayford, in the county of Kent, printer, for his having invented certain improvements in printing machines.* [Sealed August 31st, 1830.]

THIS invention applies to the printing of calicoes, silks, and other goods of that kind, and also paper for hangings, and consists in a peculiar mode of adapting engraved plates to a machine, for printing patterns or devices on those sort of goods.

The improvements proposed may be considered under two heads; first, the peculiar method of constructing and applying these engraved plates to a printing machine; and, secondly, the means by which such plates may be advantageously worked in a printing machine.

The designs, patterns, or subjects intended to be printed, are, in the first place, to be engraved upon their copper plates, in the way that art is usually practised for calico and silk printings. The plate is described as being equal in length to that of the bed roller of the machine, which corresponds with the width of the calico or silk to be printed, and the width of the plate may be equal to any portion of the pattern.

The plate, when engraved, is to be bent into the form of a segment of a cylinder, by pressing it upon the surface of a mandrel, or metal roller; it is proposed to do this by passing it through the machine, by bearing against the face of the plate, with a wooden block or stout board.

Upon the metal cylinder in the machine called the bed roller, a segment block is to be fixed, by screws or otherwise, the surface of the block being concentric with the axis of the roller, but raised a few inches from its periphery, and extending so far round the roller, as shall be equal to the breadth or extent of the portion of the pattern engraved upon the plate. Upon this block the bent plate is to be secured by turning its edges over the sides of the block, and passing screws or pins through it into the block to hold it fast.

The material, whether silk, calico, or other goods, intended to be printed, is to be conducted in an endless length between the face of this plate on the bed roller, and the periphery of the press roller; the force of which causes the impression to be taken in the ordinary way upon the calico, silk, or other fabric, as it passes through, when the machine is put in operation: the inking of the plate, that is, supplying it with colour, being effected by a ductor and scraper as usual. It is further to be observed, that two of these segment plates may be employed at the same time affixed to rollers, the one below, and the other above the press roller; which will afford the means of printing two distinct parts of the pattern by the same movement of the machine.

When one impression has been given, the calico, or silk must be shifted forward, while the plate is receiving a fresh supply of colour for the next impression: observing, that the machine is to be furnished with stops, in order to arrest the progress of the calico or silk, exactly at those points which shall bring the parts of the pattern last printed, to coincide or join correctly with the corresponding parts of the pattern about to be printed by the next movement.

These parts however are common to machines employed for printing by rotary cylinders, and so are the general arrangements of the printing press, the only feature of novelty herein claimed, being the employment of a curved plate, fixed upon a segment block on the surface of a roller for printing calicoes, silks, paper hangings, or other similar kinds of articles.

An engraved plate of this construction may be employed, extending only part of the way across the machine, that is capable of printing a portion as half, or a quarter only of the breadth of the calico or silk at one impression, and which of course will require to be shifted laterally, to give the pattern over the whole breadth of the piece.

This is proposed to be done by mounting both the printing and pressing rollers in a frame, which shall be capable of sliding sideways. The plate as before described is bent to the form of a segment of a cylinder, and mounted upon a segment block, upon the bed roller, but only extending part of the length of the roller. The frame that carries these rollers is considerably wider than the breadth of the calico or silk which passes through it, to be printed, and a projection from the frame at one end is acted upon by a rotary cam, which moves round as the rollers in the machine work. This cam is formed like a hoop or drum, with steps or inequalities in its edge or rim, Whilst the first portion of the pattern is printing, a flat part of the edge of the drum acts against the frame, but immediately afterwards an inclined plane on the edge of the drum comes opposite to the end of the frame, and allows it to move sideways, the frame being drawn tight against the cam by a weighted cord. By the time that the plate has come round again to give a second impression, the frame with the rollers, has moved so far in a lateral direction as to bring the plate opposite to the blank part of the piece of calico or silk, close to the side of the former impression; the print is then given, and the two portions of the pattern perfectly join or correspond, if the steps of the cam have been correctly made.

It is scarcely necessary to add that the number of steps on the edge of the hoop cam will depend upon the length of the plate, and the number of movements necessary to carry it across the entire breadth of the piece of calico or silk under operation.

The Patentee states in conclusion, "First I do not claim the use of any kind of circular shaped block or plate for printing made by casting, hammering, turning, or by any other means than those described; secondly, I claim the divided curved plate, or the division of a curved plate for printing, either across or along the goods by several successive operations, by whatever machinery it may be employed.—[*Inrolled in the Inrolment Office, Feb.* 1831.]

To JAMES THOMSON, *of Spencer-street, Goswell-street-road, in the county of Middlesex, gentleman, for his having invented certain improvements in making or producing printing types.*—[Sealed 14th February, 1831.]

THE Patentee considers that the great labour and expense attendant upon casting types for printing in the ordinary way, one at a time by hand moulds, may be obviated by casting a great number of them together in tablets, or cakes, and cutting the cakes of metal afterwards into single types.

There are two modes of effecting this object proposed; the first is by composing a form of ordinary types in the usual way, consisting of such numbers of the respective letters as may be thought desirable, and then making a mould from these types, in the same manner as that usually pursued in making stereotype plates. Into these moulds fluid type metal is to be poured, until the substance of metal equals in thickness the depth of an ordinary type. These cakes, or metal tablets of type are afterwards to be cut asunder by circular saws, or otherwise into single types; and in order to render the types of the usual thickness it is proposed, that in setting up the form, which the mould is to be made from, spaces are to be put between the respective letters, to compensate for those portions of the metal which will be removed by the saws in separating the letters.

The other mode proposed is by stamping in a block of copper the several letters in rows, in order to make the copper block a matrix for casting. This block is then to be employed as the mould above described, and a tablet or cake of metal produced, consisting of a great number of types, which may be cut asunder by saws as before explained.—[*Inrolled in the Inrolment Office, August,* 1831.]

To George Givinett Bompas, *of Fish-ponds, near Bristol, Esq. M. D. for his having invented an improved method of preserving copper, and other metals from corrosion or oxydation.*—[Sealed 4th November, 1830.]

It having been discovered that the oxydation of metals is effected by an electric or galvanic operation continually going on, between the metal and water to which it may happen to be exposed; the Patentee proposes to neutralize that galvanic action, by connecting to such metal as may be in a negative state, such a quantity of another metal, which is in a positive state, as respects the electric or galvanic circuit, as will neutralize its action.

The metals proposed to be employed, are an alloy of zinc and tin, in various proportions, according to the state of the metal, to be protected, copper, iron, or lead, and according to the state of the water to which they may be exposed, whether soft or fresh. These proportions are to be obtained by experiment; and an instrument which is capable of showing the intensity of the galvanic action, is to be employed. These alloys are to be attached to the sheathing of ships, to tanks, and cisterns holding water, and in every situation, where oxydation is to be prevented; which may be done by the neutralization of the galvanic or electric action.—[*Inrolled in the Inrolment Office, May,* 1831.]

We do not perceive in what particulars this invention differs from that which formed the subject of a Patent granted to G. Pattison, Esq. for a means of protecting the iron sheathing of ships, boats, spikes, braces, and chains from oxydation, (see London Journal of Arts, Vol. III. Second Series, page 247.)

To JOHN SMITH *and* WILLIAM DOLIER, *both of Liverporl, in the county palatine of Lancaster, gentlemen, for their invention of a durable copy book, or writing tablet, and improved delible ink, to be used therewith.* [Sealed 14th October, 1831.]

THE Patentees consider that a very great waste of writing paper is caused by young persons who are learning to write; they therefore propose as a matter of economy that their tablets should be used, from which the ink may be wiped off, and the same employed again for a fresh copy. These tablets are to be about the substance of a card, and bound up in a book like ordinary copy books.

In making these tablets thin calico is to be first strained flat, and then rubbed with pumice stone, to remove any knots or lumps; after which a coat of size is to be laid over the calico on both sides, and when the size is perfectly dry, both surfaces of the calico are to be covered with sundry coats of composition, laid on with a trowel, and spread perfectly smooth.

The composition is to be made of fine whitening and size, with a small quantity of boiled oil. After two or three coats of this composition has been spread on each side of the calico (taking care that the preceding coat is perfectly dry and hard, before a second is laid on), the surface is to be polished smooth, to remove any grits or lumps. A thin coat of white lead and Paris white, with boiled oil, is then spread over the surface, and on being perfectly dry, the sheets may be cut up into suitable sized pieces for the leaves of the book, and bound up with pasteboard lids.

The delible ink to be used is a composition of lamp black with gum arabic, the same sort of composition as Indian ink. This being kept in a suitable state of fluidity, is to be written with by the pupil upon the tablets above described, as other ink would be written on paper, and after the copy is done with, the ink may be wiped off by a wet sponge without the slightest injury to the tablet which will then be ready for writing upon again.—[*Inrolled in the Inrolment Office, April,* 1832.]

To Isaac Strombom, *of Old Broad Street, in the city of London, merchant, for his having invented a medicinal composition or embrocation, for the cure, relief, or prevention of internal and external complaints; which composition or embrocation may alone, or with certain alterations, be beneficially used as an internal medicine.*—[Sealed 17th December, 1831.]

The materials to be compounded to make this medicinal composition—are spirits of wine, laudanum, pure olive oil, oil of cajeput, spirits of hartshorn, with spirits of turpentine. The proportions of each are not stated, but it is said, they may be combined in various quantities, and are to be used as an embrocation. It is further stated, that the same may be taken inwardly, but under what modifications is not said, nor is there any statement of the nature of the disorders, to which the recipe may be applied as a remedy or a preventive.—[*Inrolled in the Inrolment Office, June,* 1832.]

To Baron Charles Wetterstadt, *of Whitechapel Road, in the county of Middlesex, for his invention of a composition or combination of materials, for sheathing, painting, or preserving ships' bottoms, and for other purposes.*—[Sealed 6th July, 1831.]

The material to be used for sheathing ships' bottoms is an alloy of lead and antimony. The proportions recommended are from three to ten pounds of the metal antimony to one hundred of lead. An alloy made with proportions either above or below this, will not answer so well.

Plates of this alloy are to be cast of suitable dimensions and thickness, which plates are afterwards to be rolled out to the proper substance, and it will be desirable to pass the plates through the rollers crossways, as well as longways, which produces a sort of varnished surface.

An amalgam of two parts of lead, one part of antimony, and seventeen parts of mercury, is then to be prepared, and melted at about 400° Fahreinheit, which is to be spread upon the surface of the plates as a preservative. They may be cut into suitable sizes, and attached to the ship's bottom in the ordinary way.

The dross or skimming from the alloy may be mixed with sulphur; and after being pulverized, may be spread over wood like paint, as a preservative against decay.—[*Inrolled in the Inrolment Office, Jan.* 1832.]

NOVEL INVENTIONS.

Letter-press Printing by Lithography.

M. **Jobard**, lithographic printer of Brussels, has proposed to the Society for the Encouragement of Arts at Paris, a method of taking fac simile reprints from the pages of letter-press books, by transferring them to stone, by a process which he has invented; from which stone any number of copies may be printed. Some members of the society produced on the same occasion, specimen proofs of lithographic copies from printed books, which were as perfect and well printed as letter-press itself.

The particulars of the means by which these printed pages were transferred has not yet been made known, and from what we could collect, the result of the process is in some degree uncertain. This must be expected in the earliest productions of any art; but from the specimens which were exhibited, we have no doubt a mode of accomplishing this art is known, and that nothing but experience and practice is wanting to bring it to a high state of perfection.

The importance of this art is much greater than may be at first anticipated; one of its uses will be the multiplication of copies of scarce and valuable works, the demand for which would not be sufficient to remunerate the expense of setting up the type, and printing a new edition.

Musical Time Beater.

An instrument called a Metronome, for measuring the beats, and giving the accents, and time in all the different modes of tone, to regulate musical performances, has been introduced from America, and made the subject of a patent here. It is expected to be very shortly before the public, and we have no doubt will be found extremely useful, particularly to learners and amateurs playing in concert. It stands in a small compass upon the table, or by the side of a pianoforte, and gives slight inaudable beats, which may be perceived by the performances without interfering with the tones of the intruments on which they are playing.

Tallow.—An improved mode of preparing and clarifying tallow has been invented by a medical gentleman of Clapham, named Watt, which appears to divest the tallow perfectly of all disagreeable odour, and enables it to burn in candles without smell, smoke, or guttering. The process is said to be simple, and the cost not more expensive than that of the ordinary mode of melting.

A method of treating rank fats and kitchen stuff forms also a part of the invention, and which is rendered perfectly sweet and hard. Mould candles made from this prepared tallow, even in the warm weather when the thermometer stood at 70° in the shade, were found to be sufficiently hard to be drawn within two hours after the melted tallow had been poured into the moulds.

Steam Carriages.

There never was a time when the subject of locomotion appeared to occupy so extensively the attention of the scientific world. There have been no less than eighteen Patents granted from the commencement of this year, for inventions connected with rail ways, steam engines, and carriages, and there are now no less than eleven inventions having the same object, which are likely to become the subjets of Patents very shortly.

Improved Pill Boxes.

A patent has recently been granted to Messrs. Mosley and Bell, of Wandsworth, Surrey, for a new mode of manufacturing pill boxes by machinery. The forms of these boxes are produced by pressure with dies; they are made of thick paper, and appear extremely neat, having embossed surfaces. The sides of the boxes are of the same piece as the tops or bottoms, and without joints, which prevents the inconvenience so much complained of in the former pill boxes, where the tops and bottoms being only stuck into the rim which constitute the sides of the boxes were perpetually falling out, and consequently rendering the boxes useless, to the very great inconvenience and loss of the druggist.

Insignificant as this article may appear, we understand that the demand amounts to many thousand gross per annum, and that a very great number of children are employed in the manufacture.

AMERICAN PATENTS.

For an improved mode of applying Water to Water Wheels; JOSEPH MICHENER, Clinton county, Ohio.

The wheel used is the common flutter wheel, which is to have eight buckets. The wall of the dam is not to be built vertically but is to incline two inches towards the wheel. The water is to pass through a funnel, or opening, above the wheel. The arms supporting the buckets are not to form radii with the shaft of the wheel, but are to be set back, to prevent the water falling in towards the shaft. The water is to act upon three buckets at once.

"I claim the setting of the arms back, which prevents the water falling towards the shaft, which will give more power on the wheel; also the inclination of the breast of the dam; and also the fall funnel, and applying the water, or action of three buckets at a time."

Brief as we have been, we have used more words than the Patentee in his whole Specification, wishing to enable our readers to perceive the whole merit of his invention.

For an improvement in the Mode of raising Vessels out of the Water; Joshua Cleeves, Elmira, Tioga county, New York.

It is proposed in this Patent to raise a vessel perpendicularly, by means of levers. Wharves are to be built, forming a slip into which the vessel to be raised may enter. A strong frame is to be made, like a raft. This is to fit in between the wharves, and to be the platform upon which the vessel is to be supported. The frame is to be sunk so that the vessel may float in over it, and then be secured upon it in a vertical position, by proper bilgeways, &c. Along each side of the platform vertical pieces of iron rise so as to project above the wharves, where they are to be operated upon by levers, which, it is stated, may be attached, and put into action, in various ways; there are to be poles, or other contrivances, for securing the uprights as the vessel is raised. When the platform has been elevated as high as low water mark, or to the height intended, sliding pieces of timber, ranged in each wharf for the purpose, are to have their ends pass under the edge of the platform to sustain it and the vessel thereon. The whole is described in very general terms, and no claim made. We apprehend that in a practical essay, with a large vessel, the raising with levers would present difficulties which would prove this mode to be very inferior to that of the screw dock, for which it is intended as a substitute.

LITERARY NOTICES.

Within these few days two new works have been introduced to the public on the subject of Patent Laws, the one "A Supplement to a Practical Treatise on the Law of Patents for Inventions, with Suggestions of many Alterations in that Law, and an Abstract of the Laws in force in America, Spain, Austria, Netherlands, and France, by Richard Godson, M.P, Barrister at Law, of the Temple, London;" the other, "The French Law and Practice of Patents for Invention, by Anthony Perpigna, A. M. L. B. Barrister of the Court Royal of Paris."

The Practical Treatise on the Laws of Patents from the pen of Mr. Godson, published some years ago, is so well known as a work of talent and research that we feel persuaded our readers will hail the present supplementary treatise as a valuable adjunct to the former, and the more so because within the last few years, under the direction of the late Lord Chief Justice Tenterden, the practice of the Courts on Patent questions in giving a more liberal construction to the laws in favour of the Patentee, has been so widely different from the dictum of former judges, that we have had to learn again our legal creed, and to take our precedents from *new*, not old decisions.

The present work of Mr. Godson, though comprised within the smooth compass of about one hundred pages, affords a fund of information upon the modern practice in cases of Patent Right, and the remarks and reasonings accompanying each recited case display the intimate knowledge which the author possessed, both of the subjects under consideration, and the laws bearing upon them.

The opinions of the learned author as to the revision of the old Patent Laws, and the formation of a new code for the protection of inventive talent, assimilate perfectly with our own, and we confidently hope that at no very distant day the honourable member will have the opportunity of advocating this question in Parliament, and of bringing to a successful issue, a discussion on which our readers and ourselves have long felt a deep anxiety.

The constant intercourse both commercial and intellectual which has of late been carried on between France and England, renders a knowledge of the French Laws for the protection of inventive talent scarcely less important to us than that of our own. The work of Mr. Perpigna before us affords precisely that information which we stand particularly in need of—the present practice of the French Courts on questions connected with Patent Rights.

The subjects treated in this work may be comprehended under the following general heads. 1st, The nature of a patent, the several kinds of patents, and the subjects patentable under the French laws. 2nd, On what conditions, granted to whom, and for what terms. 3d, The right and interest vested in a patentee—how protected—and the remedies against infringement.

These several points are explained and illustrated by the reports of cases tried before the French Courts, with frequent allusions to parallel cases, and the legal practise in England, embracing also the opinion of our great lawyers.

The author in this little treatise, displays a thorough knowledge of his subject, which he has written in English with clearness and perspicuity, in an easy and agreeable style. The work reflects great credit upon him, particularly as a foreigner, and we have no hesitation in recommending it to the perusal of all who may be interested in protecting their inventions by Brevits in France, as embracing a fund of valuable information, relative to the French laws, which is not to be found in any other book in our language.

List of Patents

Granted by the French Government from the 1*st of July to the* 30*th of September*. 1832.

PATENTS FOR FIFTEEN YEARS.

To Mr. Rotch, Benjamin, of London, represented by Mr. Perpigna of the French and Foreign Office for Patents, Rue-Neuve St. Augustin, No. 28, for an improved method of tanning leather.

— Bataille, Ambrose, for an improved harrow.

— St. George, of London, for an hydraulic machine for grinding corn, and other purposes.

— Dez-Maurel, François Mairie Agathe, for the application of bituminous cement, to make floorings for rooms.

— Gantillon, Christophe Elie, for a new stuff, made of silk.

— Delamorre, Charles François Hyacinthe, for an improved kind of sluice for docks.

— Moulin, Jean, for a new method of compounding manure.

— Danton, Samuel, for an improved method of making buttons.

PATENTS FOR TEN YEARS.

— Mr. Halette of Arras, for a new kind of hydraulic press with an elastic piston.

— Rinez, Jacques, for a new machine for raising and conveying goods.

— Lepage, Henri, for a new kind of fire arm, to be loaded at the breech.

— Perrot, Louis Jerome, of Rouen, for a new method of printing cotton and other tissues.

— Szymanski, Leon, of Paris, for a new method of conveying wood and timber.

— Galle, senior, of Paris, for a new indented chain for driving machinery.

To Mantigony, Pierre Antoine, of Vienne, for a new method of dressing cloth.

— Labourey, Jacques, of Marseilles, for an apparatus for propelling a ship by manual labour.

— Lecocq, Octave Amédée Louis, of Paris, for a rotary eccentric pump.

— Fayard, Antoine, of Paris, for a new syringe.

— Halé, Louis Casimir Marcellin, for an apparatus to give the dressing to cloth by means of steam.

— Tourdant, Gabriel, of Paris, for a mechanical apparatus applicable to the conveying of goods by land.

— Spindler, Auguste and Co. for a new harness for weaving.

PATENTS FOR FIVE YEARS.

— Gilain, Dusart Jacques Joseph, for a method of economising the consumption of fuel in steam engines.

— Trouchet, Tissonnierre Henri, of Soissons, for a method of preventing chimneys from smoking,

— Billy, Jean Guillaume, of Lyons, for an improved silk-winder,

— Laroche, Mathieu Nicolas, of Rouen, for improvements in the manufacturing of sail cloth.

— Villian, François Theodore, for an economical cooking apparatus for the use of the navy.

— Laraud Antoine, of Perigueux, for a new method of hotpressing every kind of paper.

— Chamel, Jean Baptiste Jerome, for a new method of extracting the sugar from beet root, without using any press.

— Ricod, Victor, of Brussels, for improved powder horns.

— Bousseroux, Jean, of Paris, for improvements on some parts of the cooking apparatus of Mr. Harel.

— Gille, Jean Baptiste, of Paris, for an improved clock with an alarm bell.

— Blanchin, Jean François Sabastien, of Paris, for elastic tissues.

— Ferry, Pierre, François, of Paris, for a new liqueur called Sophaz de Perse.

— Puteaux, Louis François, of Paris, for a new kind of stove.

— Duperron, François Louis, of Paris, for a method of directing balloons.

To Aubé and Co. of Paris, for a newly invented analeptic powder.

— Rouchon, Antoine, of Berzerac, for a new method of removing from hemp and flax all the particles injurious to workmen.

— Dubief, Guillaume, of Macon, for a new machine for pounding plaster of Paris.

— Boucher and Co. of Chauday, for a machine calculated to draw brass wire without using the drawing plate.

— Achard, Joseph, of Paris, for a machine to card the coarsest parts of silk, wool, and flax.

— Roemer, François Joseph, of Epinal, for a new kind of wig.

— Margras, Charles Louis, of Paris, for a new kind of eye glass.

— Vacheron, Louis François, of Paris, for improvements on the system of Nalder's patent for using caoutchouc in suspenders and garters.

— Ferneau Petibeau, Joseph Joachim, for a permanent ink.

— Verginais, Jean Louis, of Lyons, for a machine for shearing all ornamented tissues.

— Mellin, Louis, of Paris, for an improved lamp, called by him *Sinombre*.

PATENTS FOR ADDITIONS AND IMPROVEMENTS MADE BY THE PATENTEES.

— Perry, James, of London, represented in Paris by Mr. Perpigna, of the French and Foreign Office for Patents, 28, Reu-Neuve, St. Augustin, for a second improvement on his metallic pen called *Plume-de-Perry*.

— David, Pierre, of Lyons, for a second improvement on his patent for a new winder for silks.

— Pernot, Jean, Pierre for improvements on his patent for making various fabrics, with straws of various colours.

— Oilleaux, Desormeaux, for improvements on his patent for rendering moveable every kind of iron press or vice.

— Delavelege, Auguste, for improvements on his patent for a new lamp called *Phœnix lamp*.

— Selligue, Alexandre François, for additions to his patent for an improved typographic press.

— Seabat, Louis, for improvements on his patent for a new method of preparing liquid blue.

To Guillini, Pierre Louis Etienne, for a second improvement on his method of twisting silk.

— Lepage, Henri and Perrin, for improvemens on their patent for a new fire arm to be loaded at the breech.

— Depleuc, Joseph, Pamphile, third improvement on the patent of Mr. Paret his assignor, for new instruments for weighing.

— Sisco, Antoine Dominique, seventh improvement on his patent for an instrument called *Monte-resort-boite.*

— Dez-Maurel, François Marie Agathe, for improvements on his patents for applying bituminous cements to the making of floorings for rooms.

— Mathieu, Philippe, for improvement on his new fire arms called fulminating guns and pistols.

— Perrin and Vernois, for second improvement on their patent for a process of uniting and separating instantaneously articles of small dimensions.

— Gotten, Jean Christophe, for a third improvement on his mechanical and hydraulic lamps.

New Patents

GRANTED IN ENGLAND IN 1832.

To Alexander Stocker, and William Southwood Stocker, both of the Union Rolling Mills, Birmingham, in the county of Warwick, for their invention of various improvements in machinery for manufacturing iron, and other metal tips, for the heels and toes of shoes, chain links and other articles.—Sealed 22d October,—to inrol within 6 months.

To Sherman Converse, of New York, in the United States of America, at present residing in Ludgate Hill in the City of London, gentleman, for an improvement in making or manufacturing fire grates.—Sealed 22d October,—6 months.

To George Frederick Muntz, of Birmingham, metal roller, for his invention of an improved manufacture of metal plates, for sheathing the bottoms of ships and other such vessels.—October 22d,—6 months.

To John Bourne, of Ilchester, in the county of Somerset, road surveyor, for his invention of a machine for scraping or cleaning roads and other ways.—Sealed 22d October,—6 months.

To Leopold Foucaud, of George-yard, Lombard-street in the city of London, merchant, for an invention communicated to him by a foreigner, residing abroad, of an improvement or improvements applicable to the priming of percussion locks of guns and pistols.—Sealed 2d November,—6 months.

To George Oldland, of Hillsley, in the parish of Hawkesbury, in the county of Gloucester, cloth worker, for his invention of certain improvements in machinery or apparatus for preparing, dressing, and finishing of woollen cloth and other fabrics.—Sealed 3d November,—6 months.

To Harry Scrivenor, of New Broad-street, in the city of London, gentleman, for his invention of a certain improvement or improvements in the construction of iron rail-ways.—Sealed 6th November,—6 months.

To Elijah Galloway, of Carter-street, Walworth, in the county of Surrey, engineer, for his invention of improvements in steam engines and apparatus for propelling.—Sealed 7th November,—6 months.

To William Wilkinson Taylor, of Bow, in the county of Middlesex, felt manufacturer, for his invention of an improved cloth for the sails of ships and other vessels.—Sealed 8th November,—6 months.

To John Burlingham, of Old Buckenham near Attleborough, in the county of Norfolk, for his invention of certain improvements on mills or machinery to be operated upon by wind, and applicable to the grinding of corn and other purposes.—Sealed 8th November,—2 months.

To Joseph Lidwell Heathorn, of Change-alley, Cornhill, in the city of London, ship owner, for his invention of certain improvements in rigging for ships and other vessels. —Sealed 13th November,—6 months.

To Thomas Spinney, of Cheltenham, in the county of Gloucester, gas engineer, for his invention of an improved earthenware retort for generating gas, for the purpose of illuminations.—Sealed 13th November,—6 months.

To James Vincent Desgraud, of Size-lane, in the city of London, merchant, for an invention communicated to him by a foreigner, residing abroad, of a certain method of weaving elastic fabrics.—Sealed 14th November,—6, months.

To Samuel Jones, of the Strand, in the parish of Saint Clements Danes, manufacturer, for his invention of a certain improvement or certain improvements in apparatus or part or parts of apparatus for producing instantaneous light.—Sealed 20th November,—6 months.

To Jacob Perkins, of Fleet-street, in the city of London, engineer, for his invention of an improvement in preserving copper in certain cases from the oxidation caused by heat.—Sealed 20th November,—6 months.

CELESTIAL PHENOMENA, FOR DECEMBER, 1832.

D.	H.	M.	
1	0	0	⊙ rises 7 h. 57 m. sets 4 h. 3 m.
1	0	0	Clock after the ⊙ 10m. 37 sec.
1	0	31	Jupiter sets.
1	7	12	☽ passes the meridian.
2	8	38	Jupiter's first satellite will emerge.
3	2	1	☽ sets A.M.
5	0	0	⊙ rises 8 h. 1 m. sets 3 h. 59 m.
5	0	0	Clock after the ⊙ 9 m. 1 sec.
5	10	18	☽ passes the meridian.
7	0	0	Merc. elong. max. E. 20° 52°
7	8	28	Ecliptic opposition or ○ full moon.
8	4	45	☽ rises P. M.
8	9	35	Jupiter's fourth satellite will emerge
9	9	0	☽ in Perige.
9	0	0	Saturn's ring in plane of ⊙
9	10	34	Jupiter's first sat. will emerge
10	0	0	⊙ rises 8h. 4. sets 3 h. 56 m.
10	0	0	Clock after the ⊙ 6 m 50 sec.
10	0	0	Vesta R. A. 15 h. 15 m. dec. 13. 17. S.
10	0	0	Juno R. A. 14 h. 26 m. dec. 8. 0. S.
10	0	0	Pallas R. A. 23 h. 32 m. dec. 15. 5. S.
10	0	0	Ceres R. A. 2 h. 10 m. dec 4. 27. N.
10	2	13	☽ passes the meridian.
11	5	3	Jupiter's first sat. will em.
12	9	40	☽ rises P. M.
13	0	13	Jupiter sets.
13	5	49	Mars sets.
13	6	28	Venus sets.
13	5	11	Mercury sets.
14	0	32	☽ in □ or last quarter.
14	9	21	☽ in conj. with ♄.
15	0	0	⊙ rises 8 h. 6 m. sets 3 h. 54 m.
15	0	0	Clock after the ⊙ 4 m. 28 s.
15	0	0	Mercury Stationary.
15	6	48	☽ passes meridian.
18	6	59	Jup.'s first satellite will emerge.
19	0	0	Saturn R. A. 11 h. 55 m. dec. 2° 52 N.
19	0	0	Jupiter R.A. 23 h. 29 m. dec. 4. 49 S.
19	0	9	Mars R.A. 3 h. 13 m. dec. 19. 56 N.
19	0	0	Venus R.A. 20h. 26 m. dec. 21. 16 S.
19	0	0	Mer. R.A. 18 h. 41 m. dec. 22. 30 S.
19	6	51	Jupiter's second sat. will em.
19	3	15	⊙ and Saturn in quadrature.
20	0	0	○ rises 8 h. 8 m. sets 3 h. 52. m.
20	0	0	Clock after the ⊙ 1 m. 59 sec.
21	6	56	⊙ enters Capricornus.
22	2	36	Ecliptic conj. or ● new moon.
22	2	38	☽ in conj with ☿.
23	5	14	☽ sets P. M.
25	0	0	⊙ rises 8 h. 8 m. sets 3 h. 52m.
25	0	0	Clock before the ⊙ 31 sec.
25	0	0	Mars Stationary.
25	6	0	☽ in Apoge.
25	8	55	Jupiter's first sat. will emerge.
26	0	0	Vesta R. A. 15 h. 48 m. dec. 15. 18. S.
26	0	0	Juno R. A. 14 h. 45 m. dec. 8. 48. S.
26	0	0	Pallas R. A. 23 h. 44 m. dec. 14. 38. S.
25	0	0	Ceres R. A. 2 h. 8 m. dec. 6. 38. N.
26	9	27	Jupiter's second sat. will im.
28	11	35	☽ in conj. with ♃ long. 28. in Pisces, ☽ lat. 4. 45. S. ♃ lat. 1. 16. S. diff. of lat. 2. 29.
29	0	0	Ven. in conj. with Hers. lon. 15. in Aquarius. ♀ lat. 1. 55. S. ♅ lat. 41. S. diff. of lat. 1. 14.
30	0	0	Clock before the ⊙ 2 m. 59 s.
30	8	10	☽ in □ or first quarter.
30	6	51	Jupiter's third sat. will em.

J. LEWTHWAITE. Rotherhithe.

METEOROLOGICAL JOURNAL,

FOR 1832.

1832.	Thermo.		Barometer.		Rain in inches.	1832.	Thermo.		Barometer.		Rain in inches.
	Hig.	Low	Hig.	Low.			Hig.	Low	Hig.	Low.	
Oct.						Nov.					
26	53	37	30,31	Staty.		11	47	36	29,56	29,50	,5
27	51	33	30,28	30,27		12	48	31	29,67	29,64	
28	54	43	30,19	30,07	,025	13	43	32	29,72	Staty.	
29	56	44	29,97	29,90	,05	14	53	31	29,69	29,63	
30	52	33	30,07	30,00	,2	15	49	42	29,98	29,72	,2
31	53	38	30,04	30,00		16	47	33	30,22	30,09	
Nov. 1	58	40	29,82	29,56	,125	17	45	31	30,31	30,25	
2	53	39	29,89	29,82		18	45	33	30,09	30,00	
3	54	44	29,78	29,62	,175	19	45	34	29,90	29,82	
4	52	36	29,66	29,59		20	48	37	29,73	29,64	
5	43	29	29,99	29,56	,05	21	48	39	29,59	29,55	
6	47	33	30,30	30,13	,025	22	49	37	29,70	29,55	
7	47	32	30,31	30,29		23	49	29	29,90	29,83	
8	47	36	29,99	29,86		24	51	34	29,99	29,96	
9	43	37	29,84	29,80	,045	25	49	40	29,95	29,78	,025
10	47	28	29,68	29,56	,05						

Edmonton. CHARLES HENRY ADAMS.

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Longitude 3 51 West of Greenwich.

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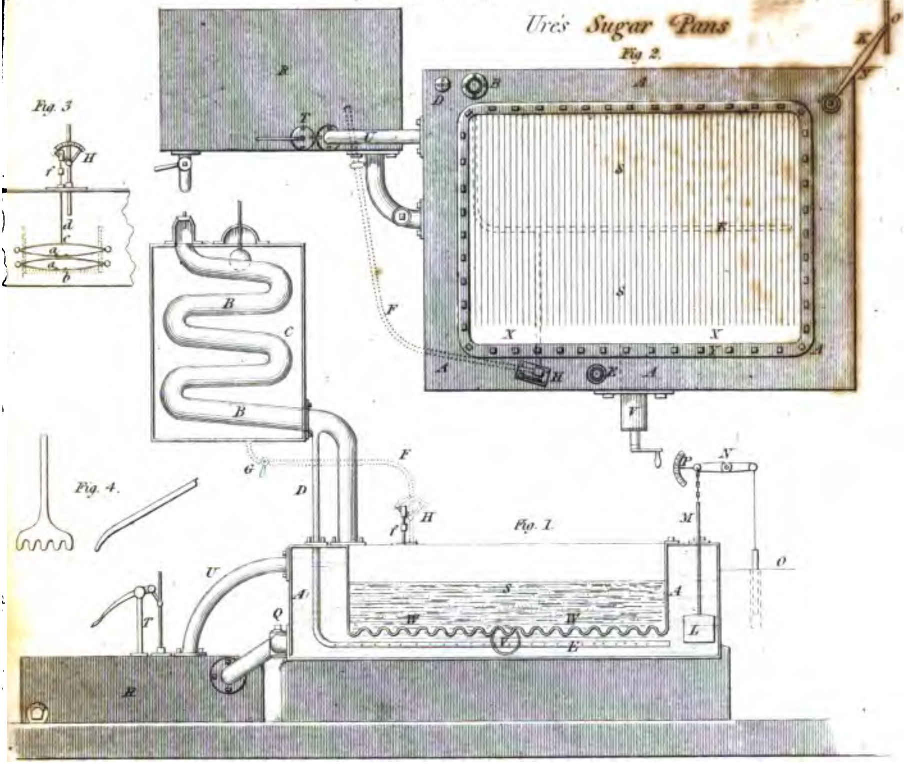
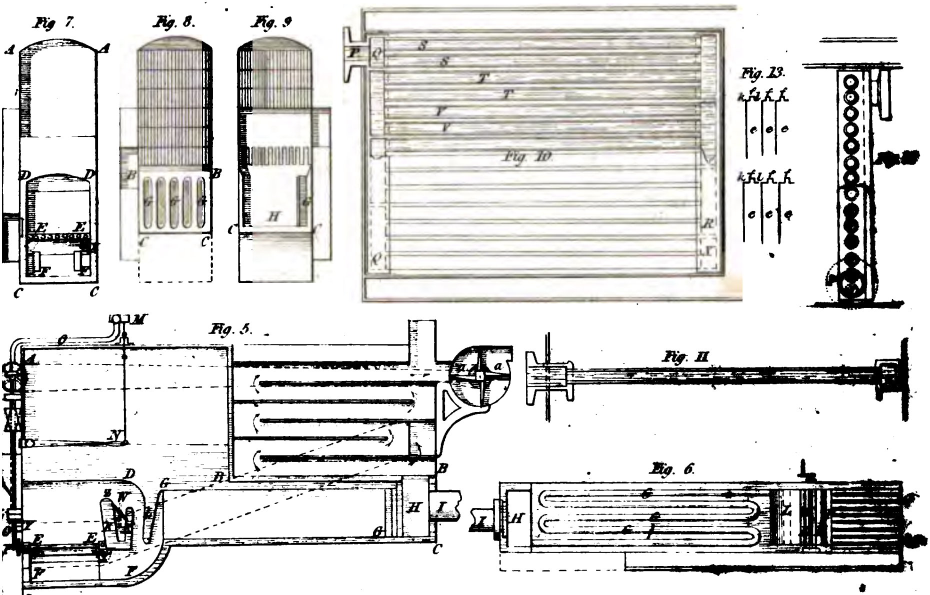
W. Guthrie, Printer, 15, Shoe Lane.



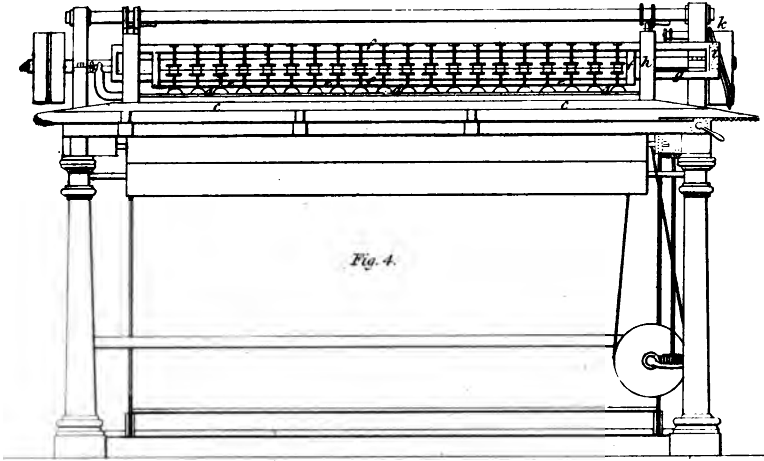
Ure's Sugar Pans

Slater's Steam Apparatus



W. Newton del. May 1st 1832 T. [illegible] sculp

Oldland's Cloth Dressing Machinery.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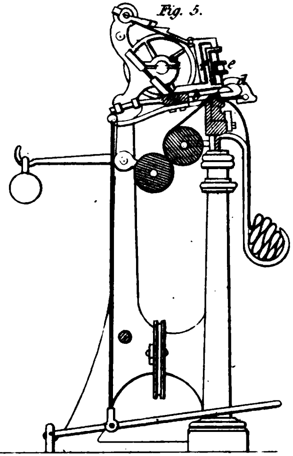
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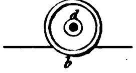
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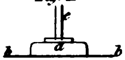
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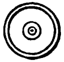
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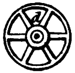
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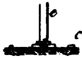
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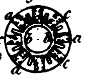
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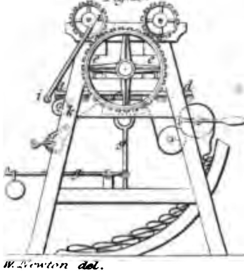
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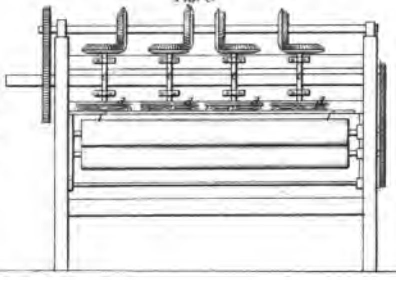
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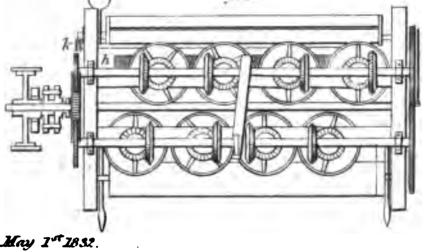
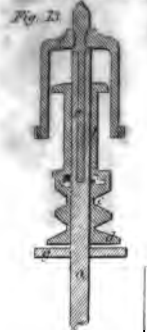


Fig. 11.

Lambert's Spinning Apparatus.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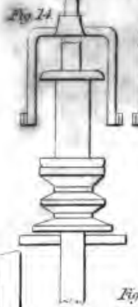
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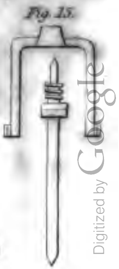
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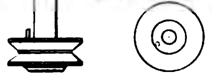


Fig. 16.

Riley's Fermenting Apparatus

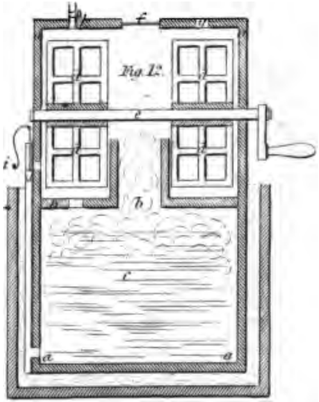
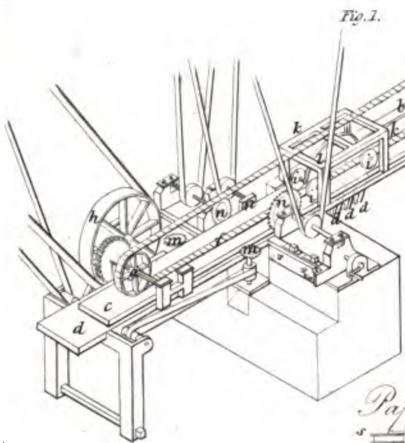


Fig. 12.

W. Newton del. May 1st 1832. T.S. Porter sculp.

Muir's Flooing Machinery.

Fig. 1.



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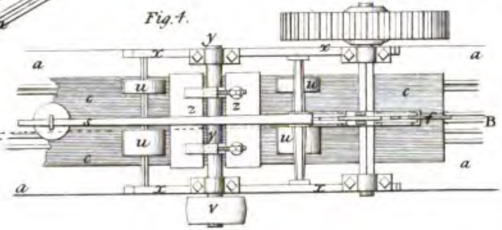

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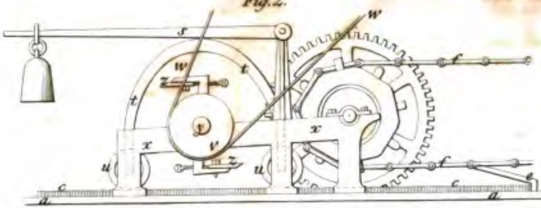

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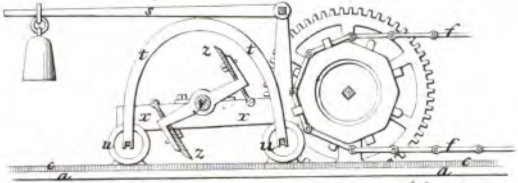
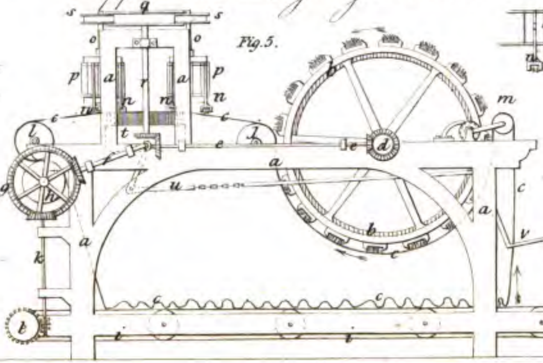


Needham's Spinning Mach.y

Papp's Cloth Dreſsing Mach.y

Fig. 5.



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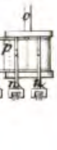

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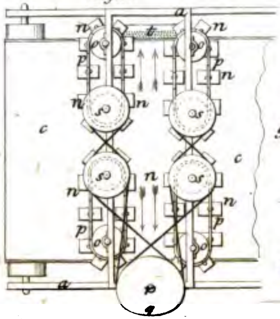

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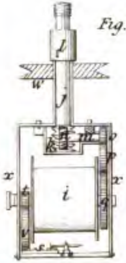

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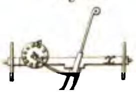

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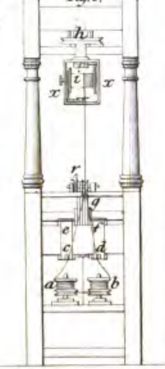

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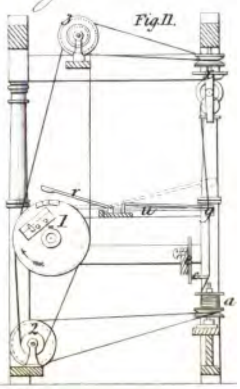

Selden's Imp.d Mills.

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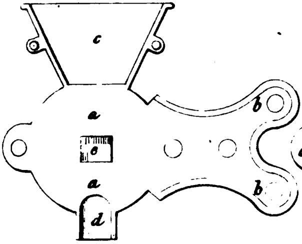

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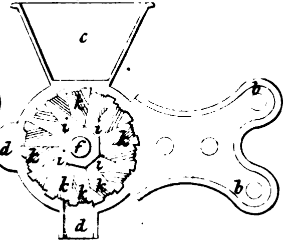

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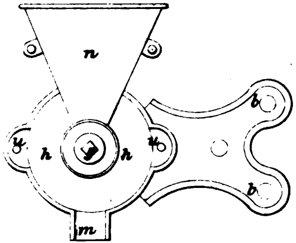

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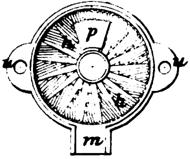
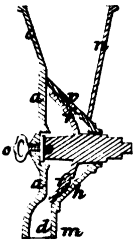


Fig. 2.



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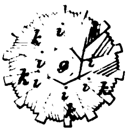
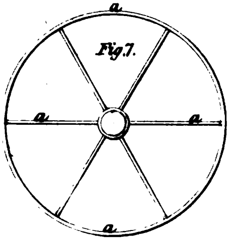


Forrester's Imp.d Wheels.

Fig. 7.



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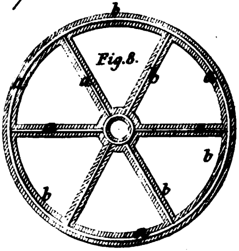
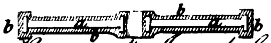
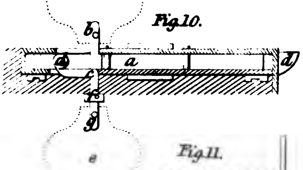




Barnard's Imp.d Locks.

Fig. 10.



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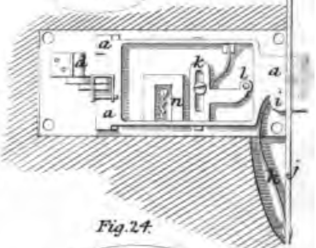
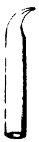


Morden & Brockedon's Imp.d Pens.

Figures.

12.



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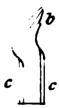

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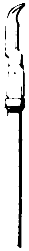

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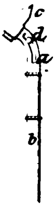

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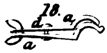

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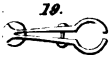

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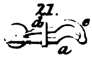

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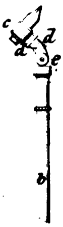

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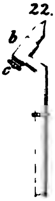

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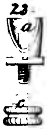

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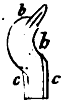

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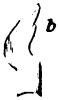
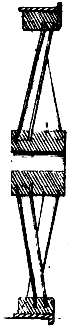


Stephenson's Imp.d Wheels.

Fig. 27.



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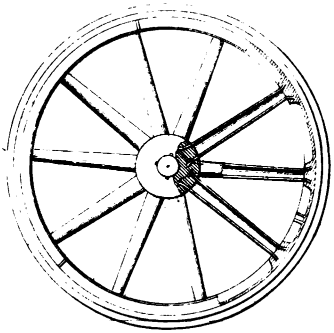

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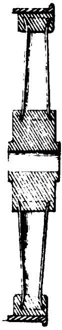

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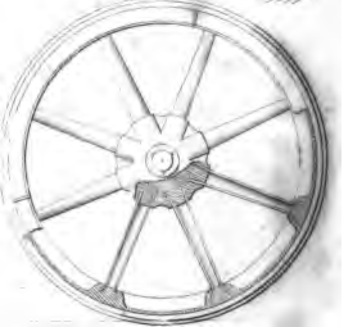

W. Newton. del.t

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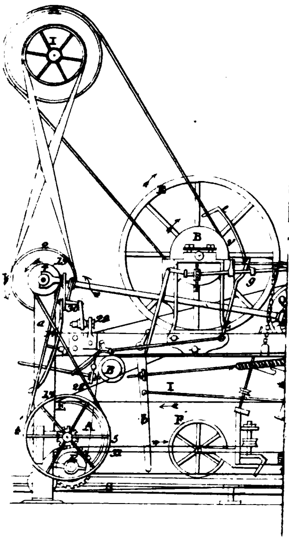

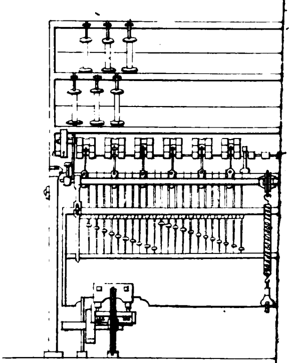

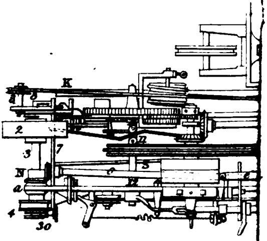

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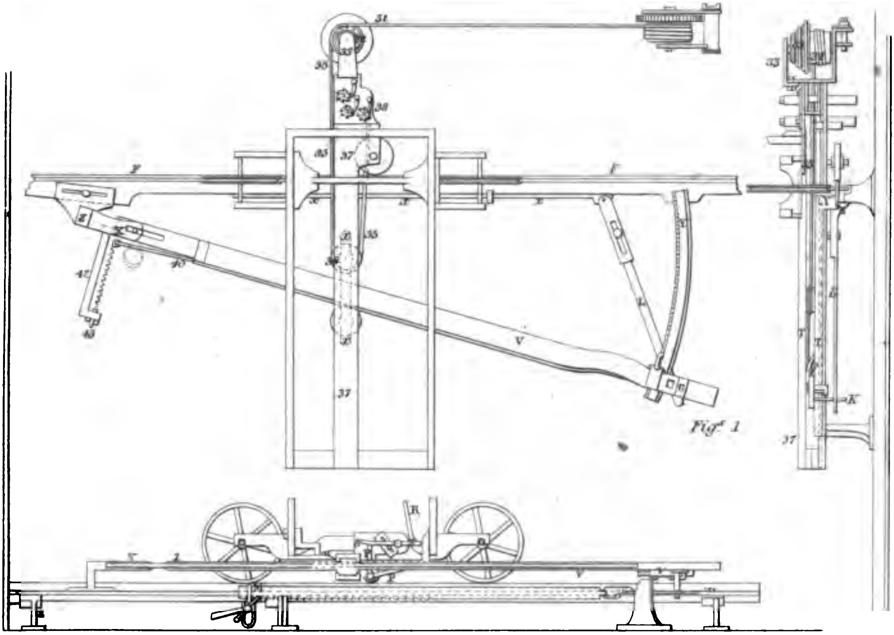
Knowles' Self-Spinning Mule



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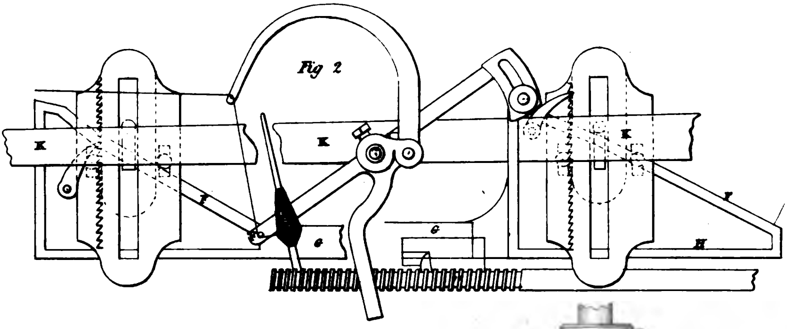

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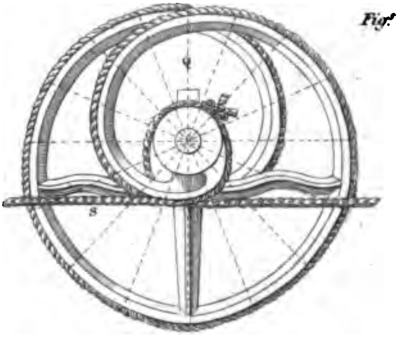

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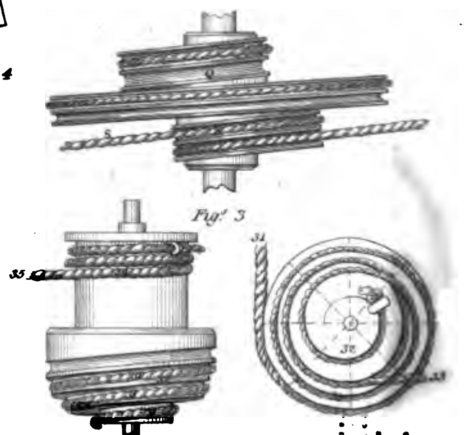

Fig. 3

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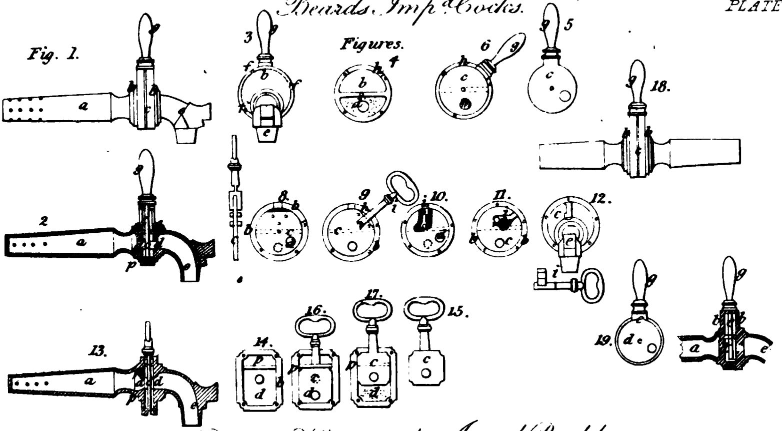
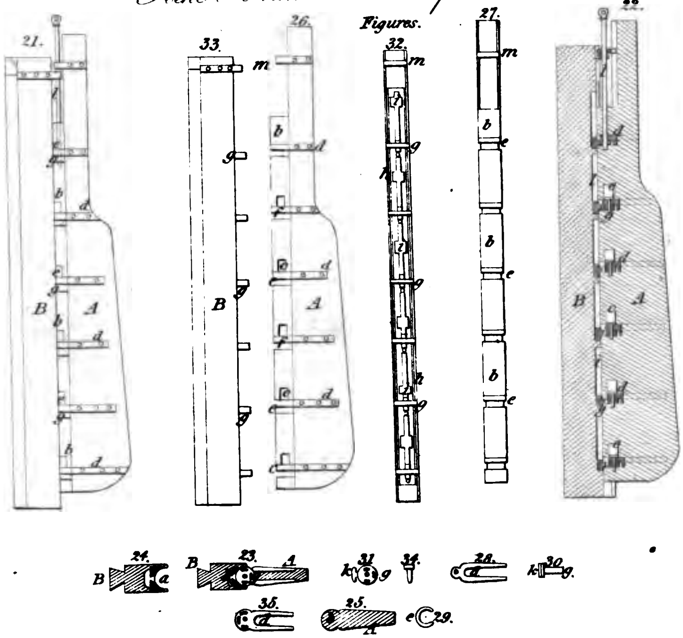
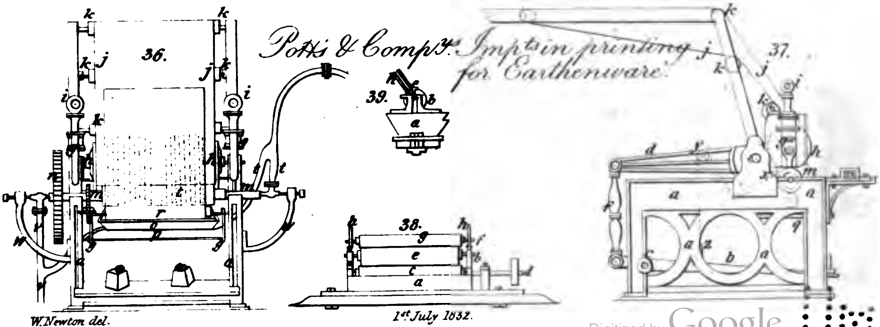


Peeke & Hammicks Impd. Rudder.



Potts & Compy. Impts. in printing for Earthenware.



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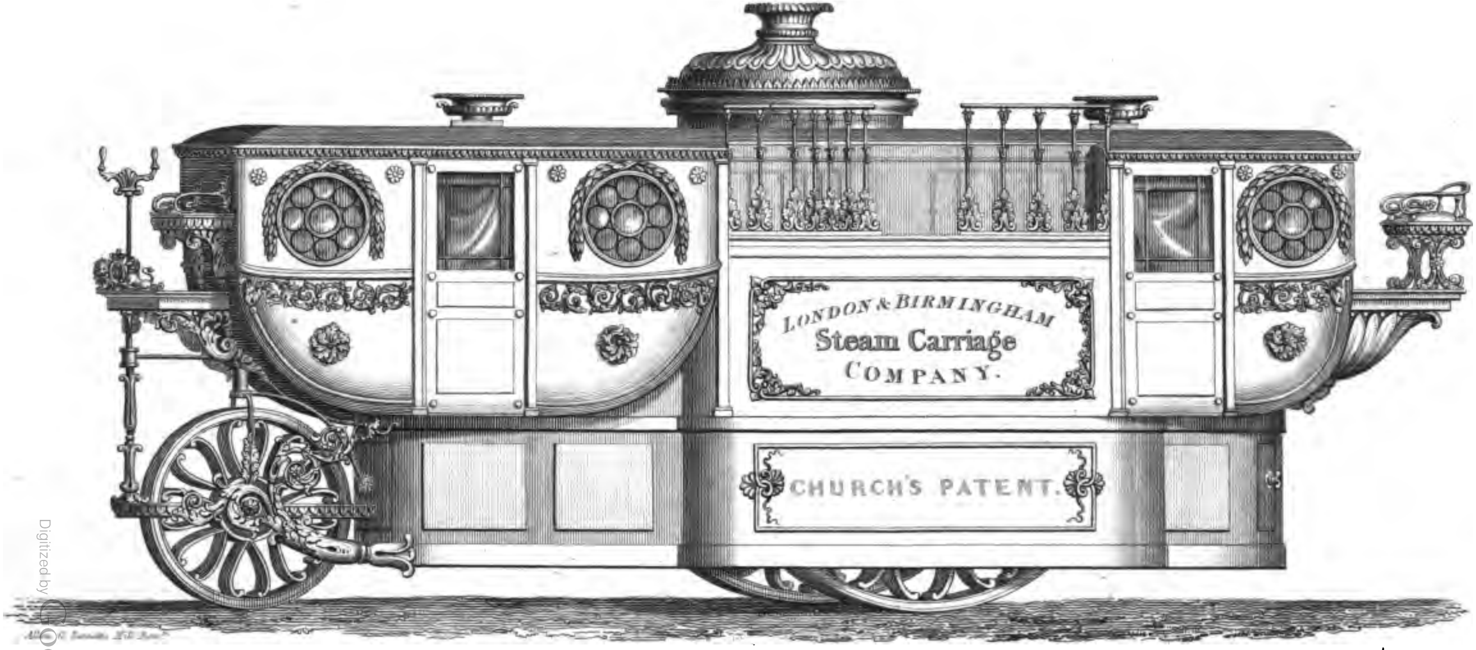
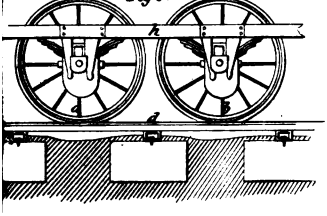
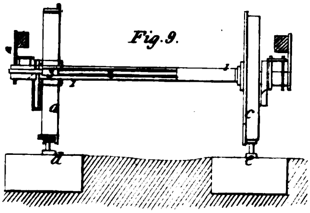


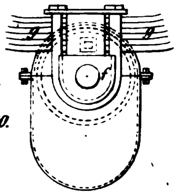
1st July 1832.

Stephenson's Imp.d Axles.

Fig. 8.







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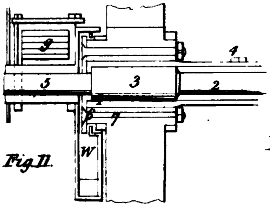

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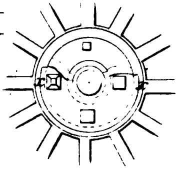


Milnes Roving Machine.

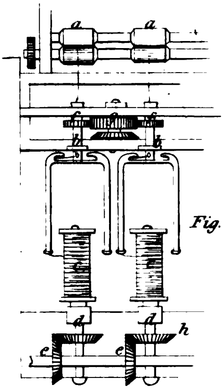
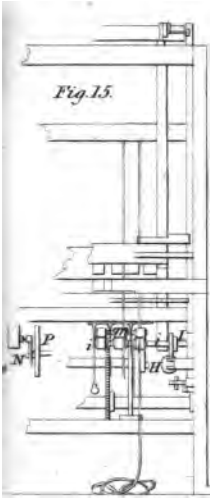
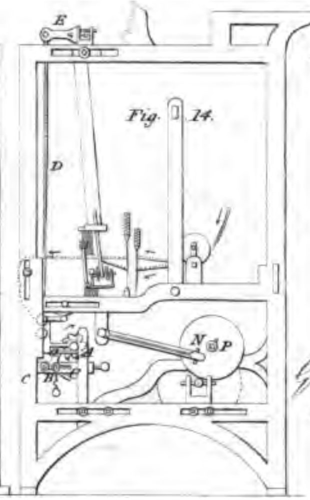


Fig. 13.

Westhead's Imp.d Loom.





Sievier's Cables.

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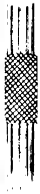

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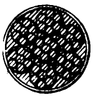

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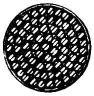

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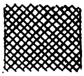

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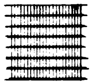
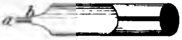


Gillott's Pens.

Fig. 16.



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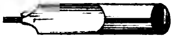
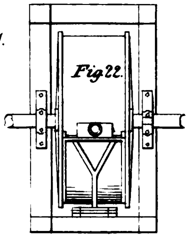
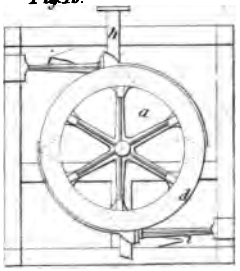




Hobday's Steam Wheel.

Fig. 18.



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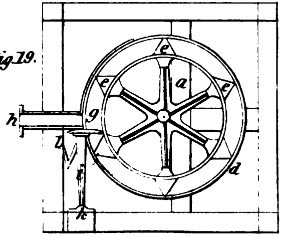

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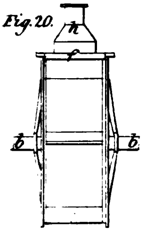

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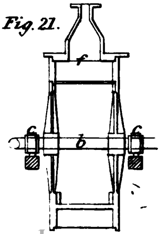
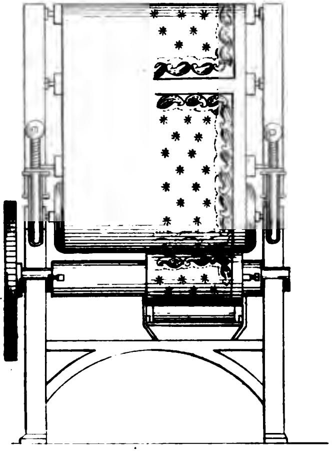


Payne's Imp.d Machinery for Printing Silk Cotton &c.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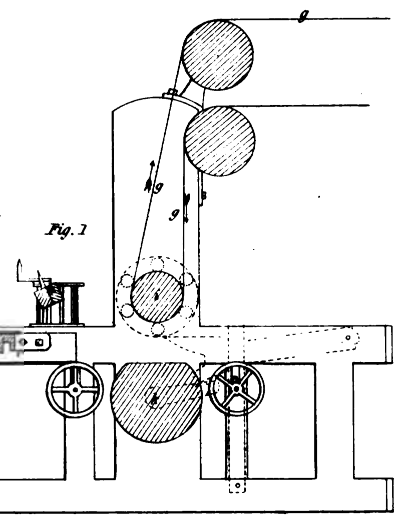
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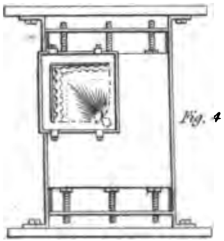
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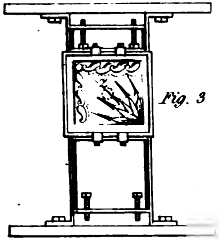
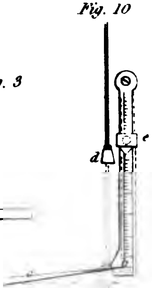


Fig. 3

Rutherford's Imp.d Locks.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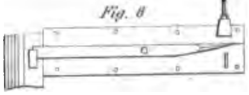
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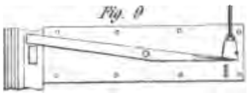
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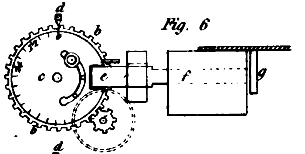
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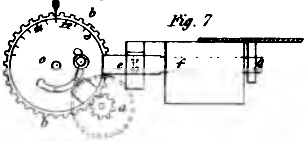
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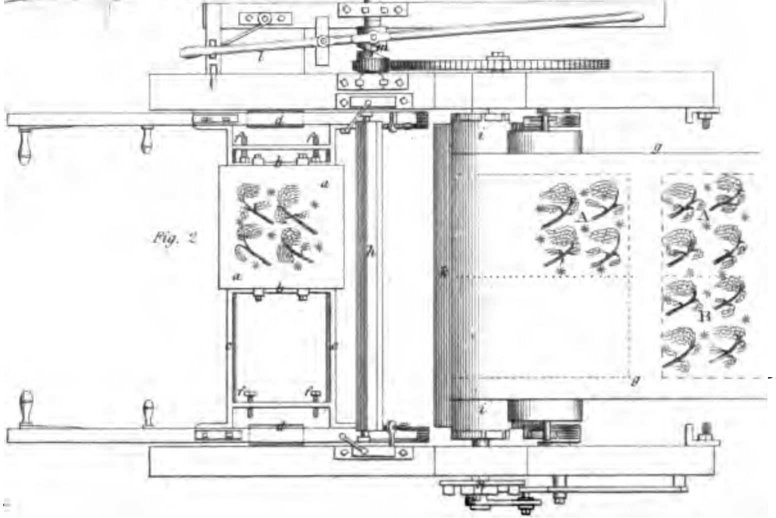
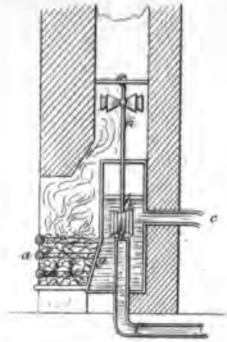
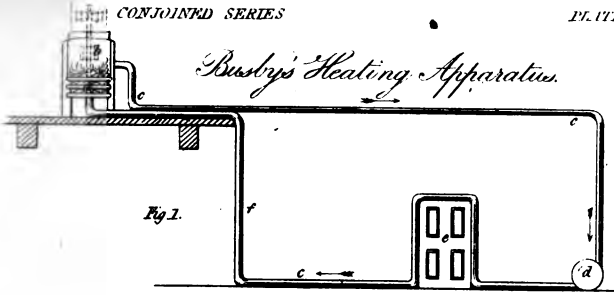


Fig. 2

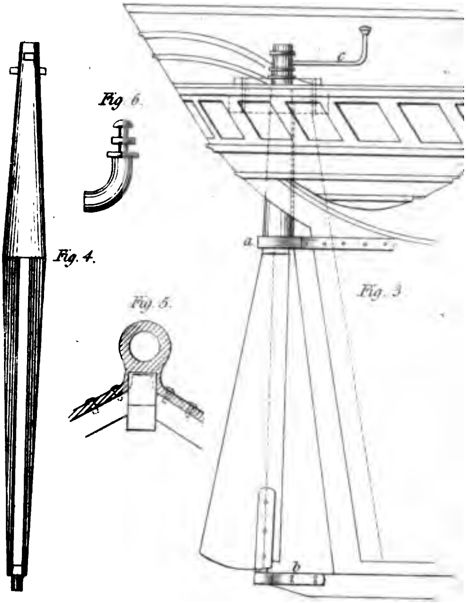
Busby's Heating Apparatus.

Fig 2.

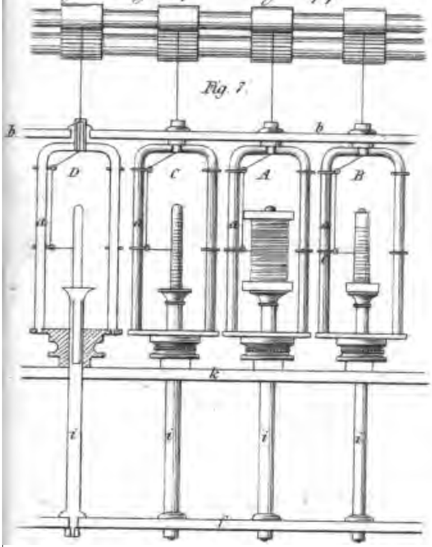




Holdsworth's Improved Rudder

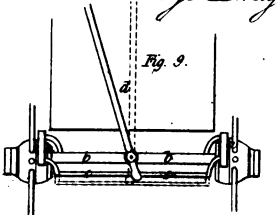


Montgomery's Spinning Apparatus.



Johnson's Carriage Drag.

Fig. 9.



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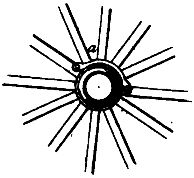
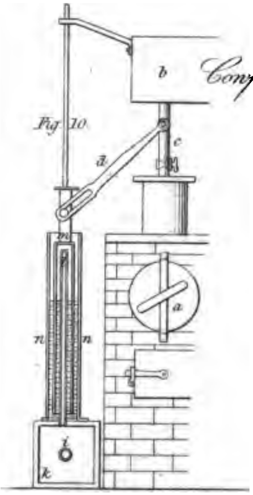
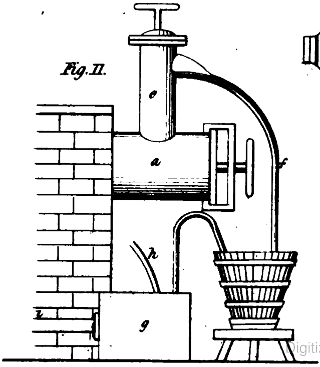


Cowper's Gas Apparatus.

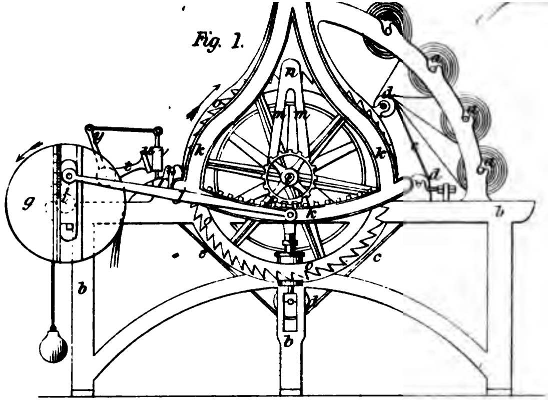




W. Newton del.t September 1st 1832 F. Mansell sc

Foudrinier's Paper Cutting Machinery.

Fig. 1.



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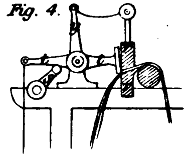

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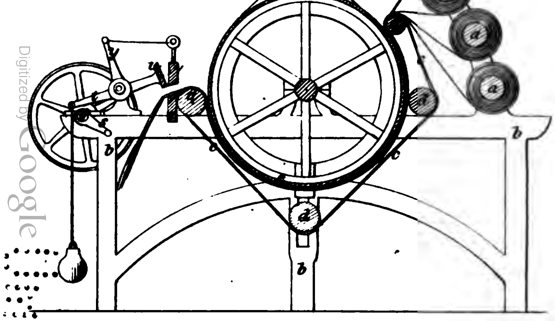

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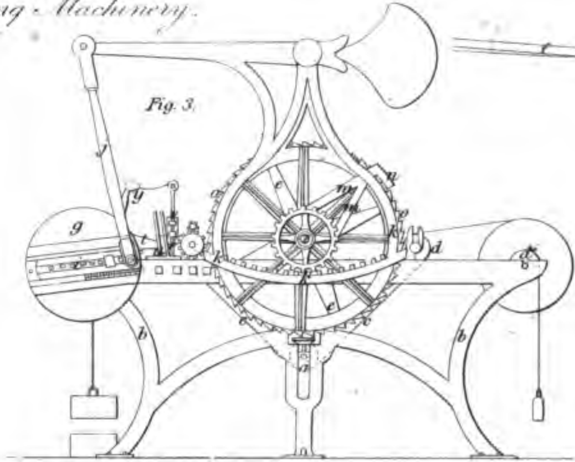

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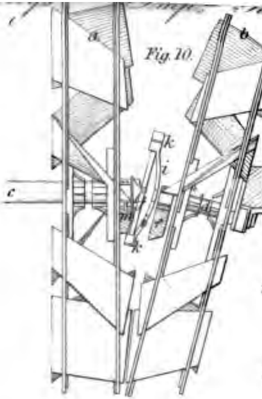

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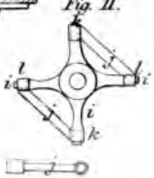
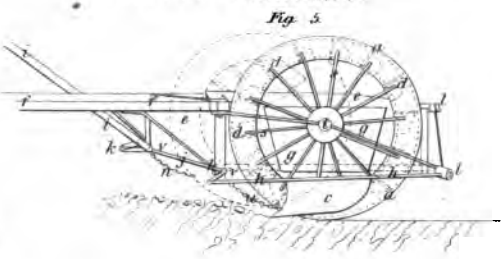


Palmer's Excavator

Fig. 5.



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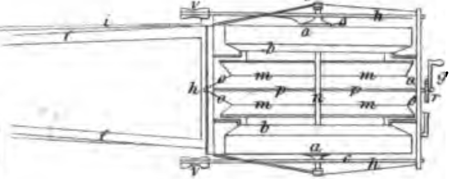

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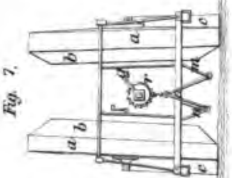

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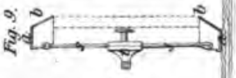
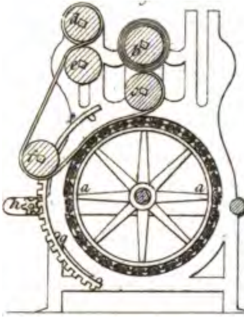


Walker's Impd. Gig.

Fig. 5.



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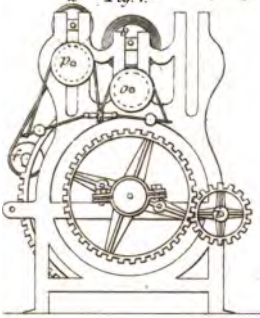

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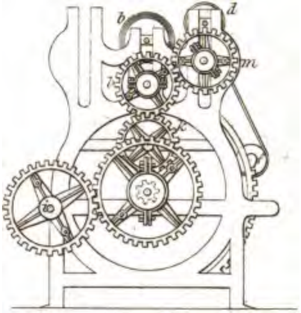
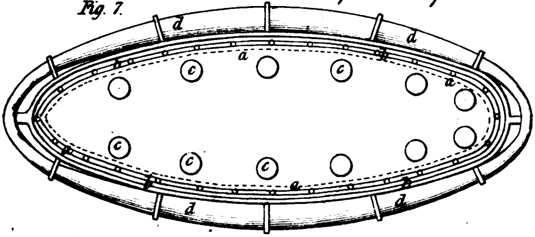


Cook's Impd. Life Boat.

Fig. 7.



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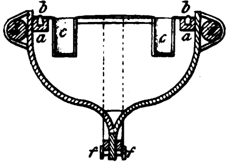

Atkinson's Impd. Gig.

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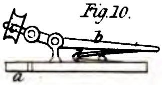

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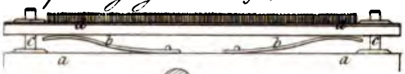

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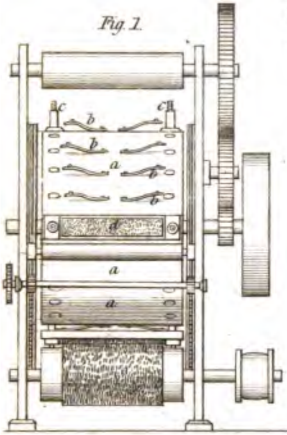

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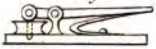

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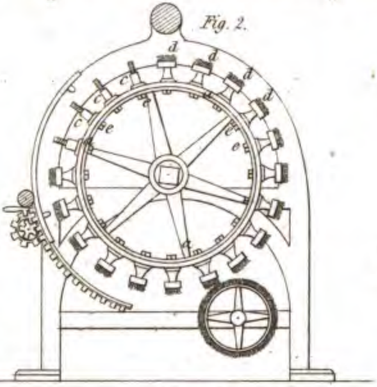

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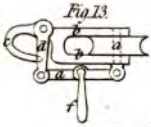

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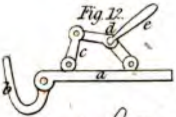

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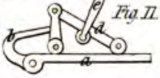
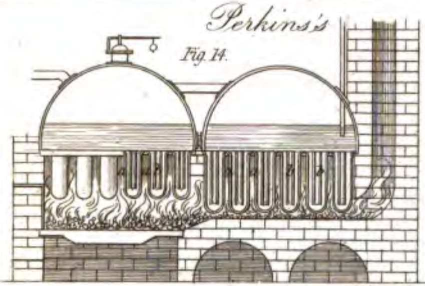


Perkins's Impd. Boiler.

Fig. 14.



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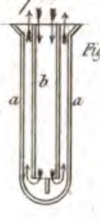

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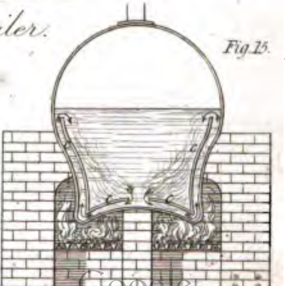
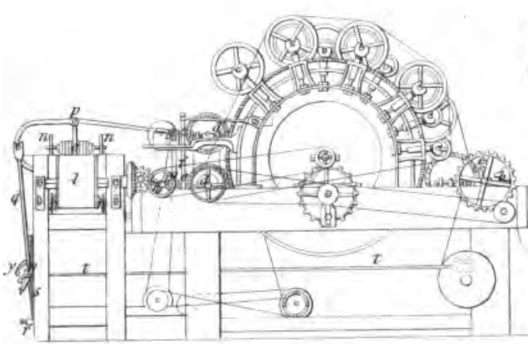


Selden's Imp.d Carding Machine.

Fig. 3.



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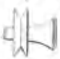

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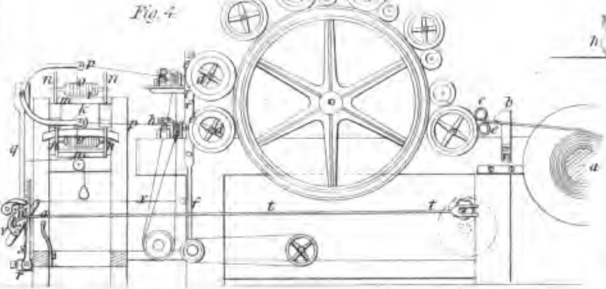

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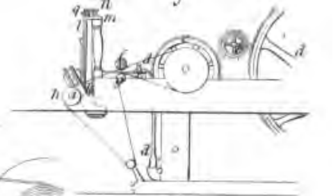

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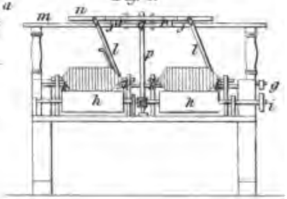

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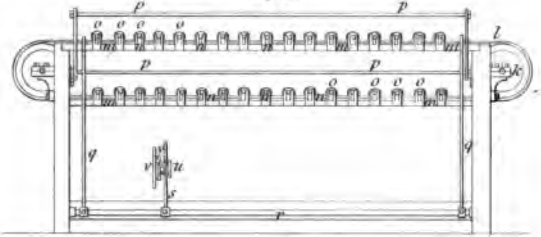
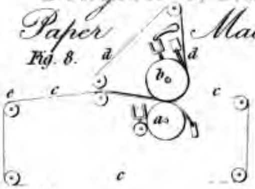


Towgood & Smiths Paper Machinery.

Fig. 8.



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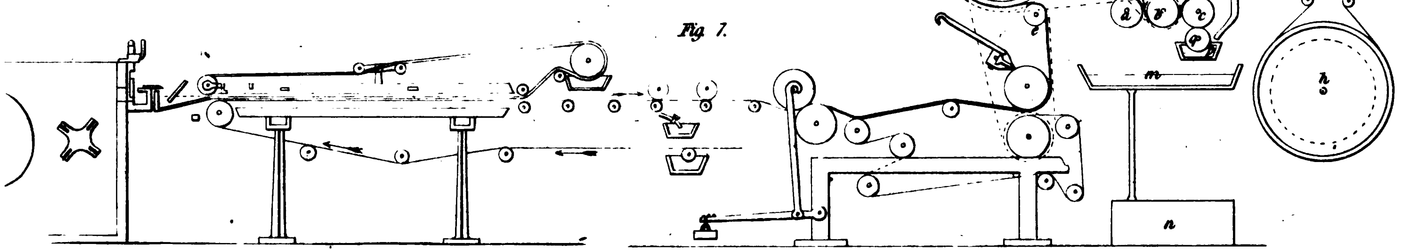
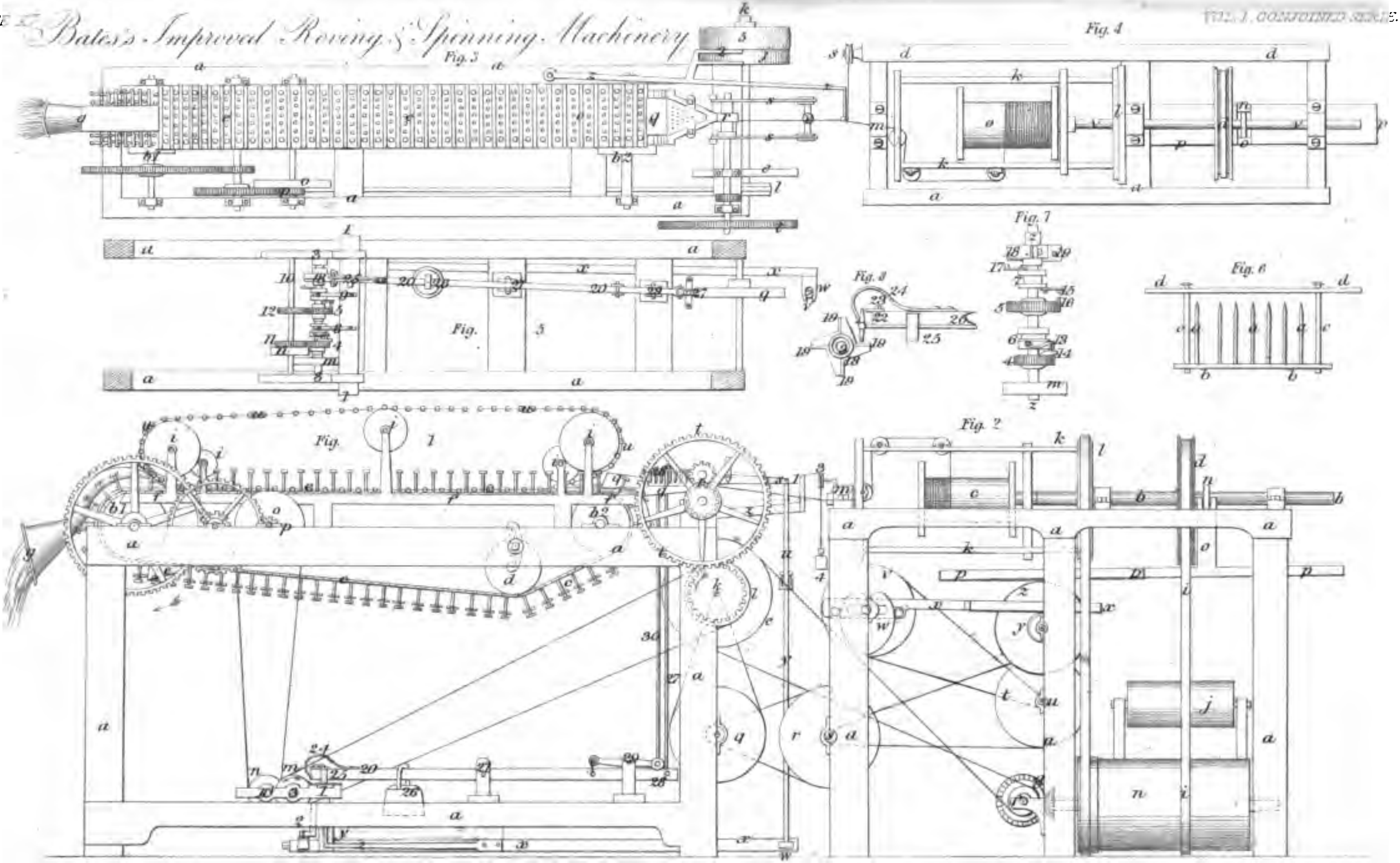


Bates's Improved Roving & Spinning Machinery



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1st Nov. 1832.

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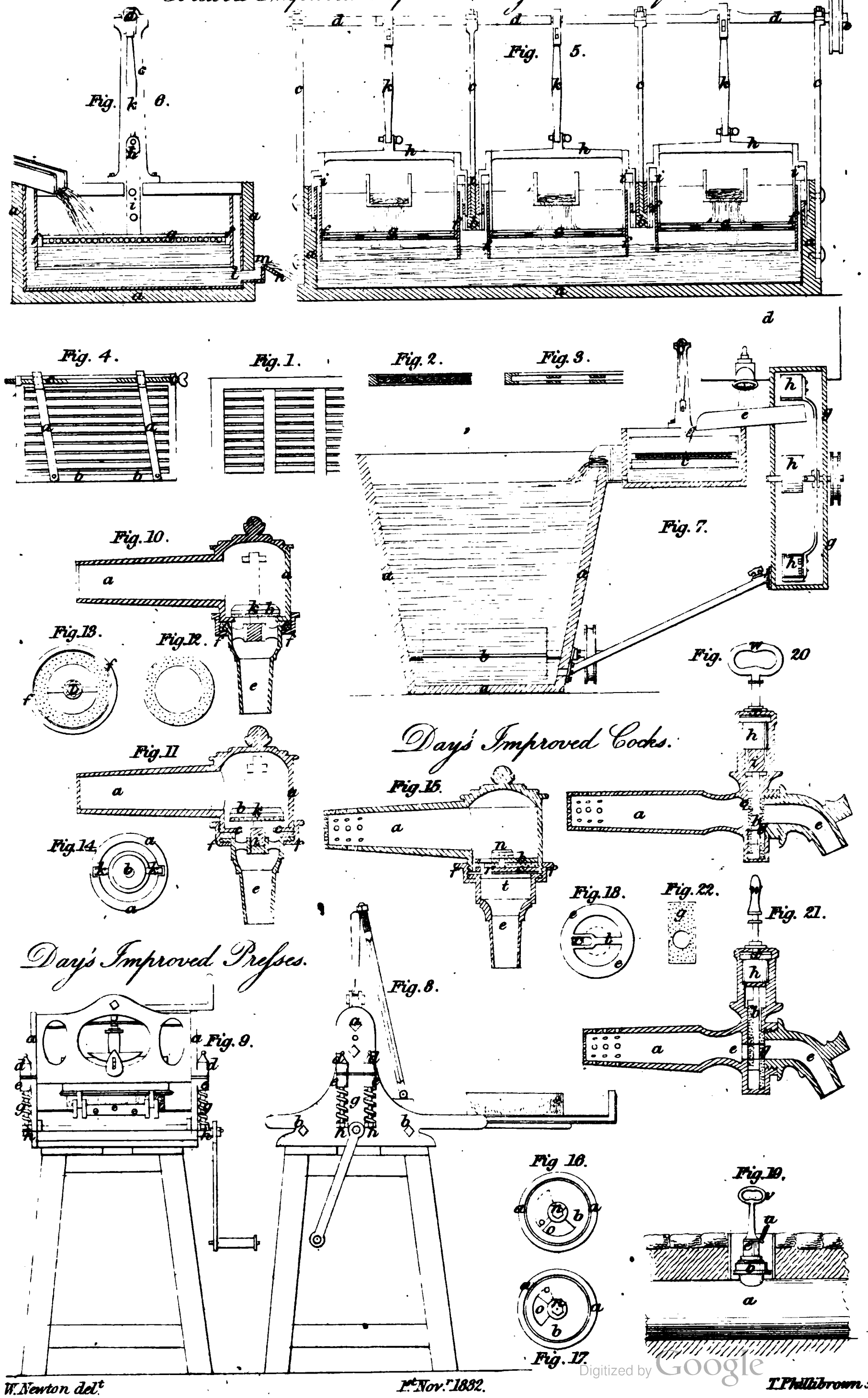
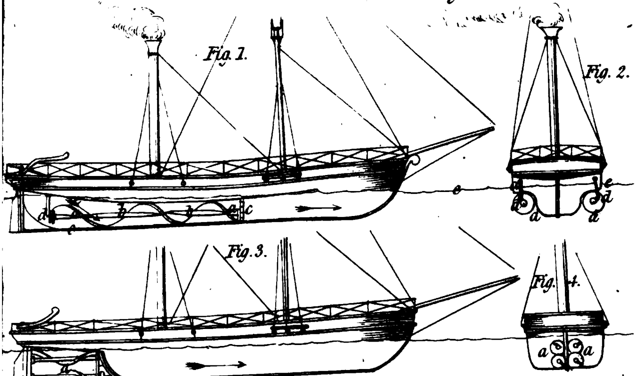


Brewers Improved Paper Making Machinery.

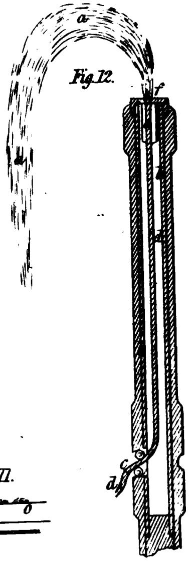
Day's Improved Cocks.

Day's Improved Presses.

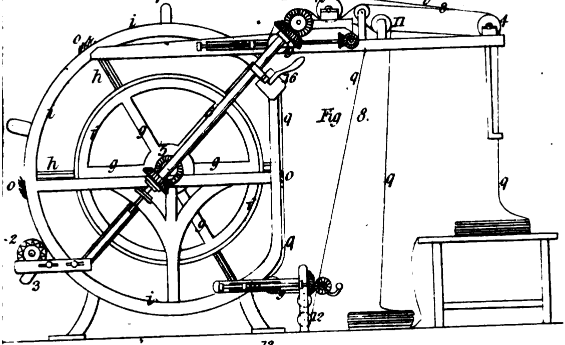
Woodcroft's Impt. in Propelling.

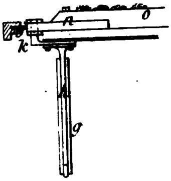


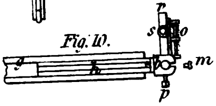
Taylor's Impt. Whip.

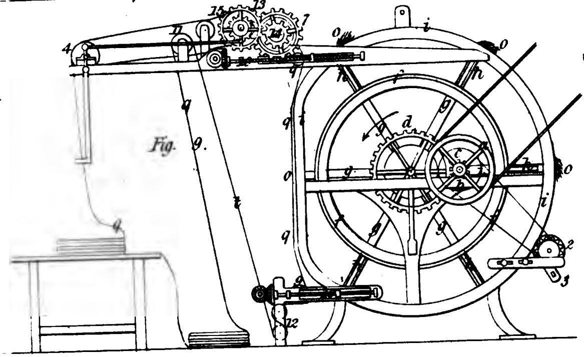


Wells' Impt. in Cloth Dressing.

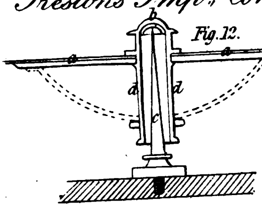




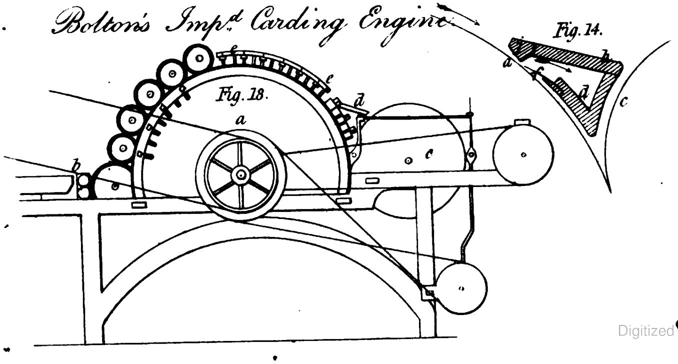




Preston's Impt. Compass.



Bolton's Impt. Carding Engine



Gaunt's Impt. Gaiters.

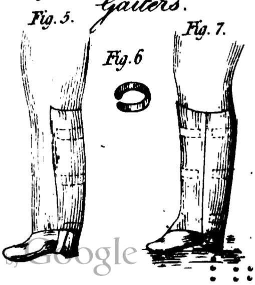


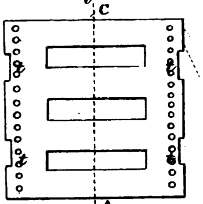
Fig. 5.
Fig. 6.
Fig. 7.

W. Newton delt.

1st Novr. 1832.

Hall's Improvements in Steam Engines.

Fig. 6



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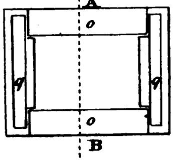

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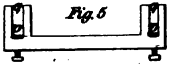

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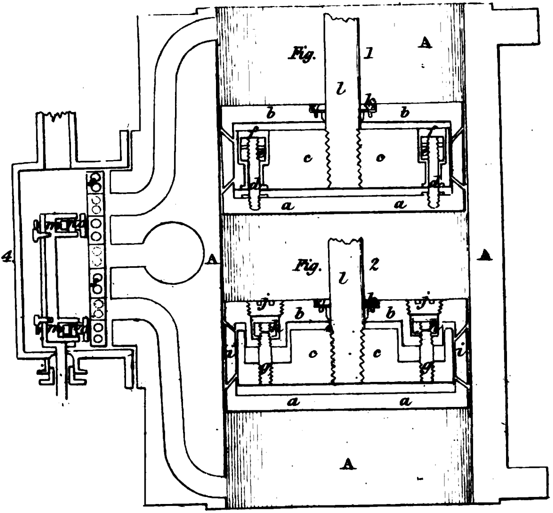


Fig. 1

Fig. 2

Fig. 10

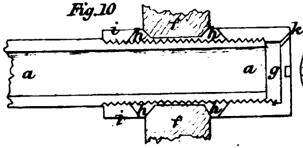


Fig. 11

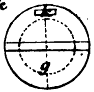
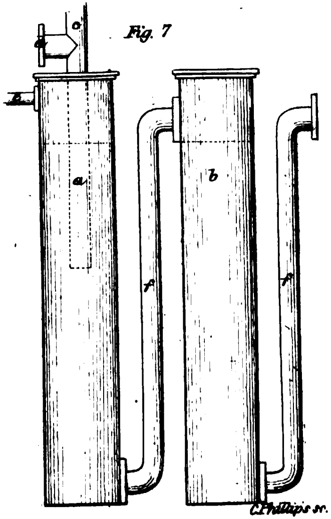


Fig. 7



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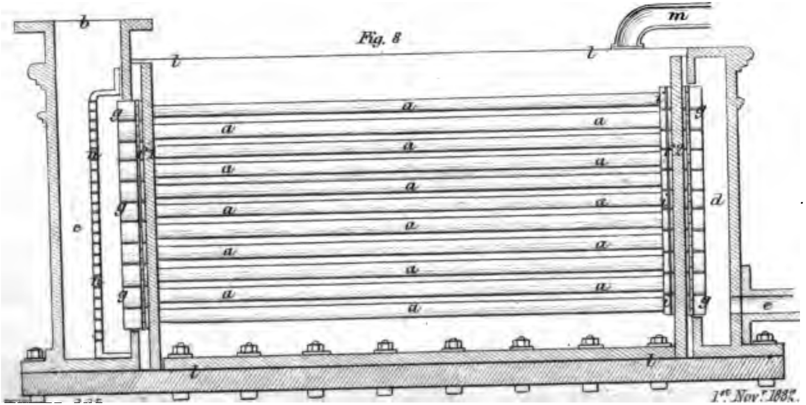

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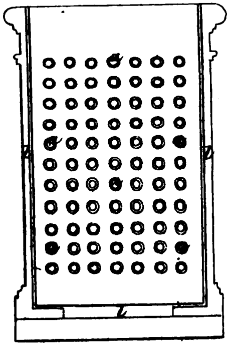
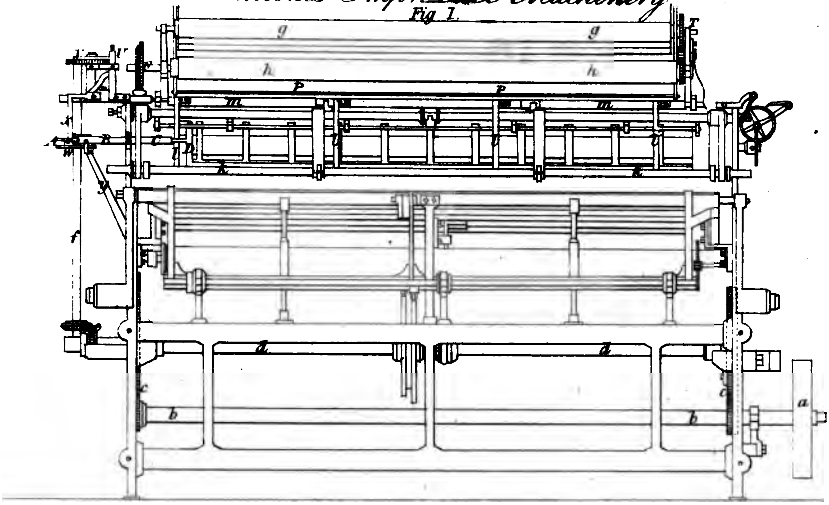


1st Novr. 1838.

C. Phillips sc.

Heathcoat's Impd. Lace Machinery

Fig 1.



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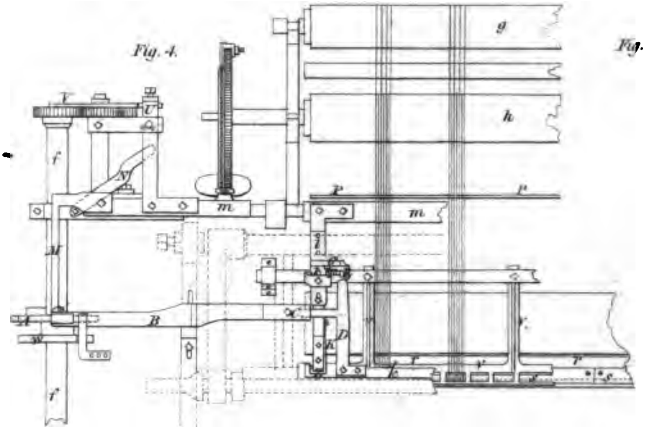

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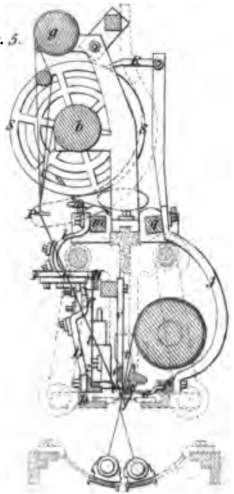

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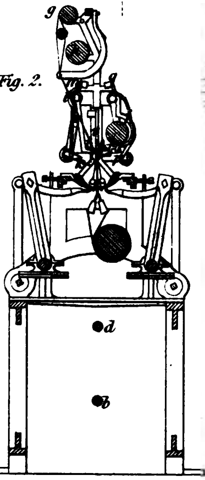

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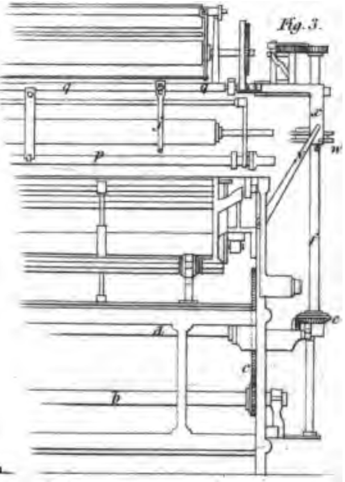

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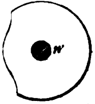

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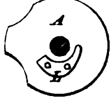

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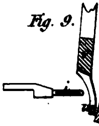

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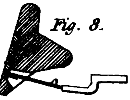

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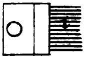

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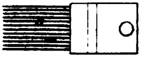


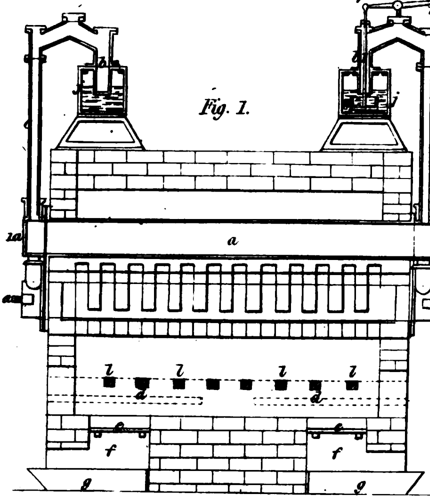
W. Newton delt.

December 1st 1832.

T. Phillibrown sc.

Lowe's Impd. Gas Apparatus

Fig. 1.



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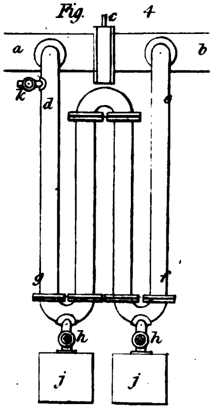

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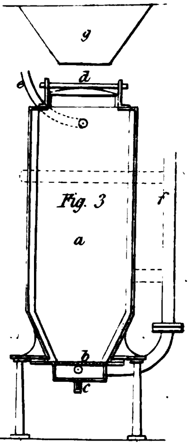

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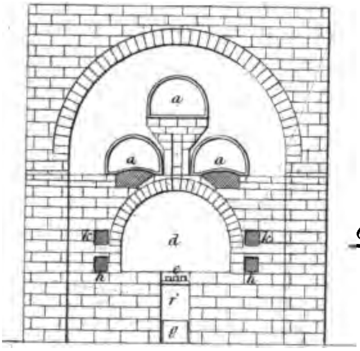


Dickinson's Paper Making Machine

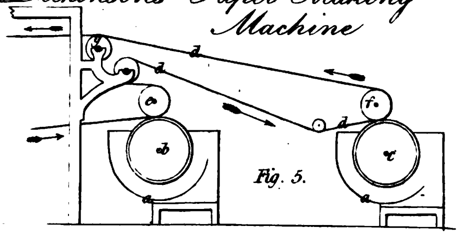


Fig. 5.

Dickinson's Paper Straining Machinery

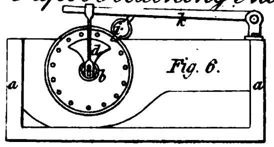


Fig. 6.

Fig. 7.

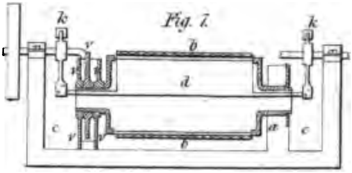


Fig. 8.

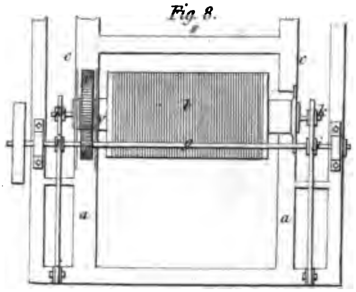
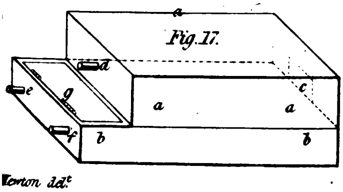


Fig. 9.

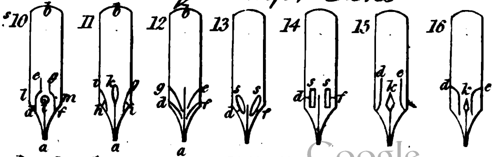
Ure's Impd. Air Stove

Fig. 17.



Perry's Impd. Pens

Figs. 10 11 12 13 14 15 16



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December 1st 1832.

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